

PUBLIC WORKS

April
1951

CITY, COUNTY AND STATE

The Concept of
Civil Defense

Civil Defense for
Water Supplies

The Toledo Plan
for Civil Defense

Traffic Control Planning
for Civil Defense

Civil Defense for
The Sewage Plant

Insect and Rodent Control
in Civil Defense

Price of this issue \$1



**CIVIL
DEFENSE
ISSUE**

**H. F. Caldwell, Director of the Civil Defense Administration,
takes the oath of office in Washington. More data on page 32.**

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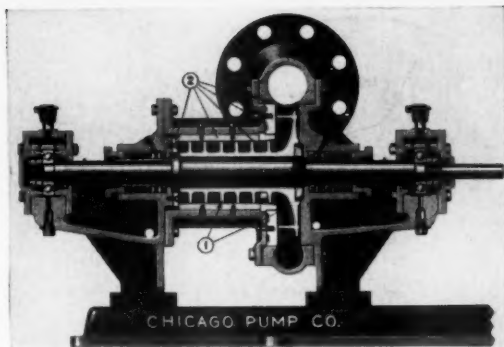
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for SEWAGE

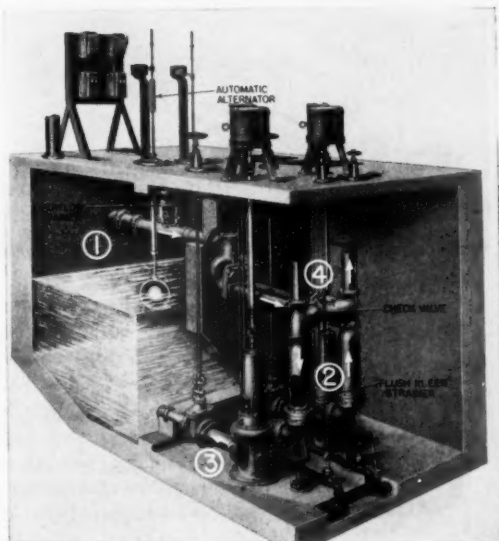
FLUSH KLEEN pumps provide automatic, trouble-free service in sewage lift-stations. They require no manual attention except periodic lubrication and inspection. No labor is required for disassembling and cleaning clogged pumps. FLUSH KLEENS are absolutely clog proof. The impellers handle nothing but strained sewage, minimizing wear and maintaining pump balance. They are the only absolutely clog proof sewage pump. The FLUSH KLEEN will pump anything that will pass through the pipe regardless of type or quantity of material.

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PUMPING

3. Strained sewage is pumped from wet well.
2. Coarse matter is backwashed from strainer.
4. Special check valve closes; sewage and coarse matter are pumped to sewers.



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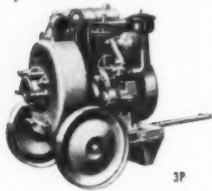
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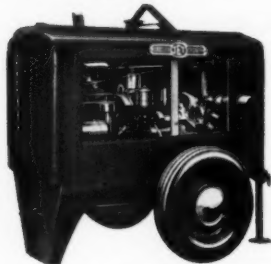
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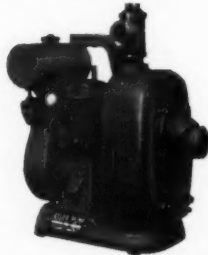
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Published Monthly by Public Works Journal Corporation. Office of Publication at Orange, Conn. Editorial and Advertising offices at 310 East 45th Street, New York 17, N. Y. Subscription rates: U.S.A. and possessions, \$3.00. All other countries, \$4.00. Single copies 35¢ each, except special issues which are \$1. Acceptance under Section 3464, P. L. & R. Authorized.

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THE ENGINEERING AUTHORITY
IN THE CITY-COUNTY FIELD



Clean pipe thoroughly — then center brass band over break, bending tab back to lock.



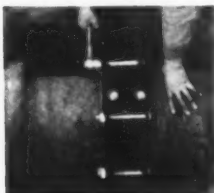
Thoroughly soap both sides of gasket and pipe with heavy soap water.



Center gasket and Monel Band over brass band.



Assemble halves of clamp over pipe and bolt together.



Insert pull bolts and tighten all around evenly.



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THE EDITOR'S PAGE



The Important Problem of Civil Defense

Civil Defense is the theme of this issue of **PUBLIC WORKS**. We are proud of the material our authors have presented and fully appreciative of the fact that, due to the pressure of planning and organizing duties, much of it represents night and Sunday work. The data given should answer many of the questions now facing municipal officials. For the most part, the material was prepared by men who are now engaged full-time or nearly so on civil defense.

There are two articles on which we would like to comment further because they contain such a strong blend of practicality and common sense. One is the article by Mr. More, describing the Toledo plan. This is exceptional in establishing a manageable organization in which is combined simplicity, direct responsibility and practicality. The number of divisions and, consequently, of details to be handled by the Director is limited; yet no essential element is lacking. We believe this plan can be applied profitably, in some cases with slight modification, to any community, large or small.

Gordon McCallum's discussion emphasizes two important points not normally given the consideration that is due them. One is that the welfare of the uninjured should be a primary, and not a secondary consideration, for upon them will fall the burdens of maintaining production, caring for the injured, training replacements and rehabilitating the community. The other is that there will be tasks to perform which are not normal in peacetime municipal operations; that planning to perform them should not be overlooked; and that they may require skills not readily available and not required in peacetime operation. Though Mr. McCallum writes on sanitary engineering, what he says is applicable to the entire program of civil defense.

Basic information in respect to civil defense for the highly important highway, airport and street field seemed essential. The Bureau of Public Roads was invited to contribute material that would provide the needed leadership and guidance. Unfortunately, the Bureau "deemed inappropriate" the issuance of information at this time. Fortunately the comprehensive data provided by Mr. Lefevre and Mr. More, out-

lining what has actually been done at state and city levels in this respect, cover this field excellently.

From time to time throughout the year, additional articles on specific subjects in civil defense will be presented. Contributions from our readers will be welcomed. We believe that sound preparation for disaster, whether natural or man-made, is a job that every community should undertake.

In line with this belief, we shall continue to publish the most practical and useful articles on civil defense we can obtain, and we shall stress, from time to time, on this page the needs for adequate planning.

Better Training Facilities are Needed for Municipal Jobs

Unfortunately, it is probably impossible for our cities and counties to meet the salary and wage scales of industry, though they surely ought to try to provide an attractive combination of compensation and career for their key personnel. Government is one of our biggest businesses and it ought to be run by well-qualified and well-trained men. Too much in money and in service to the public is involved to permit any other policy.

A thing that is needed, especially now when all signs point to another period of personnel turnover, is a well-planned training course for each of our more important municipal fields of work. It has been demonstrated that courses for water and sewage plant operators pay off in better operation, with improved plant efficiency. The same could be true for street maintenance men, refuse collection supervisors, sewer maintenance men, and other important categories.

This is a job that our colleges ought to begin work on so that if the so-called labor market—meaning all sorts of personnel—should suddenly become very tight, our cities and counties would have a place to which they could send their promising subordinates to qualify for the higher jobs. There is just as much skill required for patching holes in a street, or for supervising several gangs of refuse collectors, as there is for running a sewage or water plant. And training would pay off just as well.

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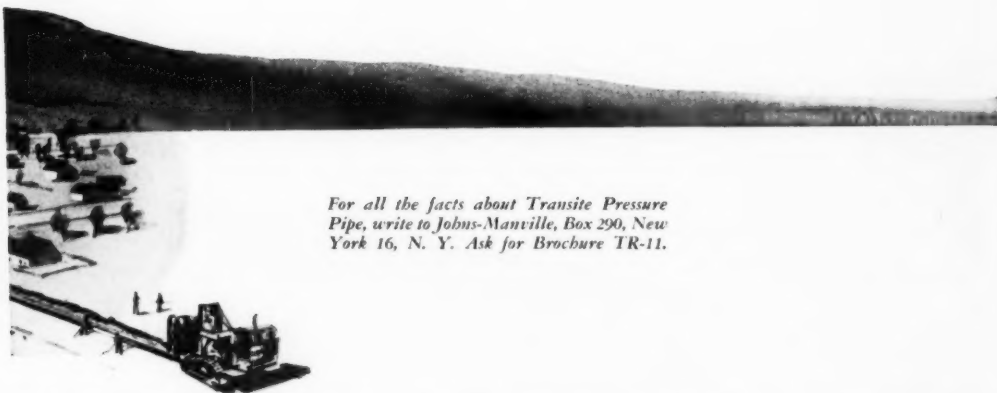
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Fluoridation News

1945  1951

W&T-DMQ:
By Fred R. Lee, Editor

W & T-DMQ
By Fred R. Lee, Editor

IN TEXAS, TOO —

CITY OF MARSHALL
MARSHALL, TEXAS

January 24th, 1951

J. W. SCHONHARDT
Water and Sewer Superintendent

Wallace & Tiernan Co. Inc.
1112 National City Bldg.
Dallas 1, Texas

Gentlemen:

The City of Marshall, Texas began fluoridation of its municipal water supply in the Spring of 1946, under the jurisdiction of the Texas State Health Department. Marshall was the first city in the State of Texas to use fluoridation.

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Very truly yours,

CITY OF MARSHALL
J. W. Schonhardt
J. W. SCHONHARDT
Water Superintendent

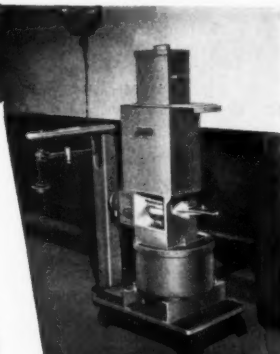
When *your* community is ready to look into fluoridation — and after you have consulted your State Department of Health — you'll find W&T Engineers ready and willing to help you.

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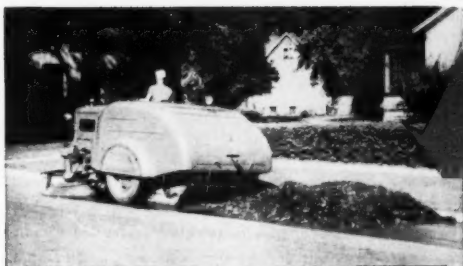
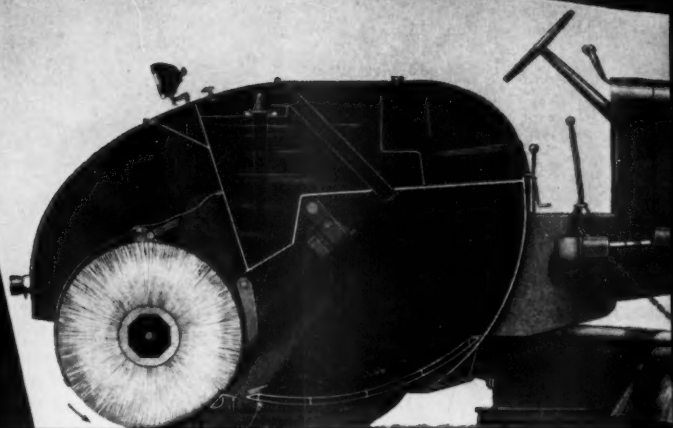
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Newburgh, N. Y. 1946

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DIRECT BROOM-TO-HOPPER SWEEPING

No complicated, expensive elevator or conveyor mechanism to keep in repair. Finger tip hydraulic control moves hopper gate to carrying and dumping positions. Load can be transported any desired distance.

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only in the Model "40," will you find this combination of features — each made possible by the other two — each making a major contribution to superlative performance and lasting service and satisfaction.

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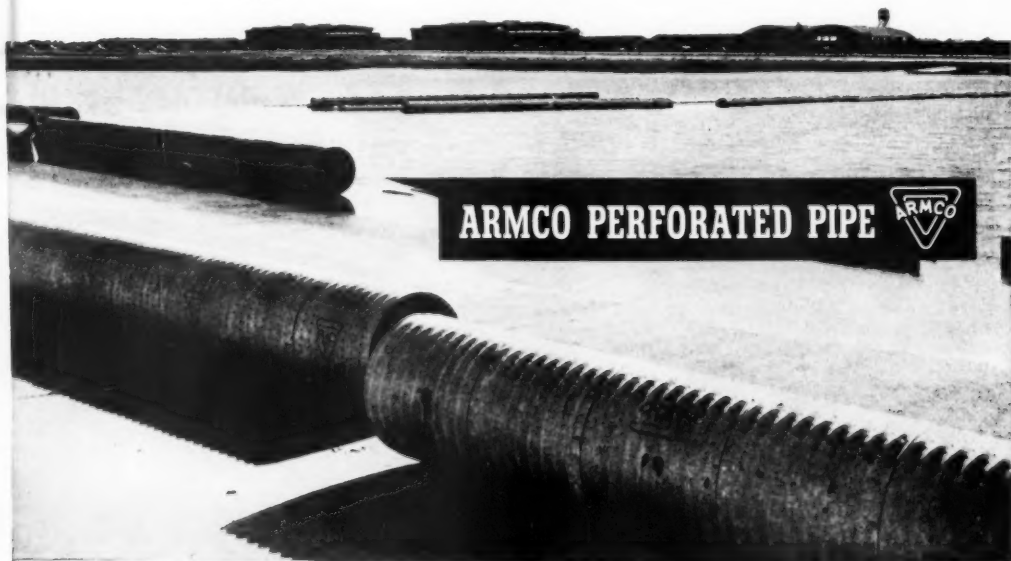
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Many engineers and city officials have found the solution to this problem. They drain the water out and keep it out economically with an Armco Subdrainage System.

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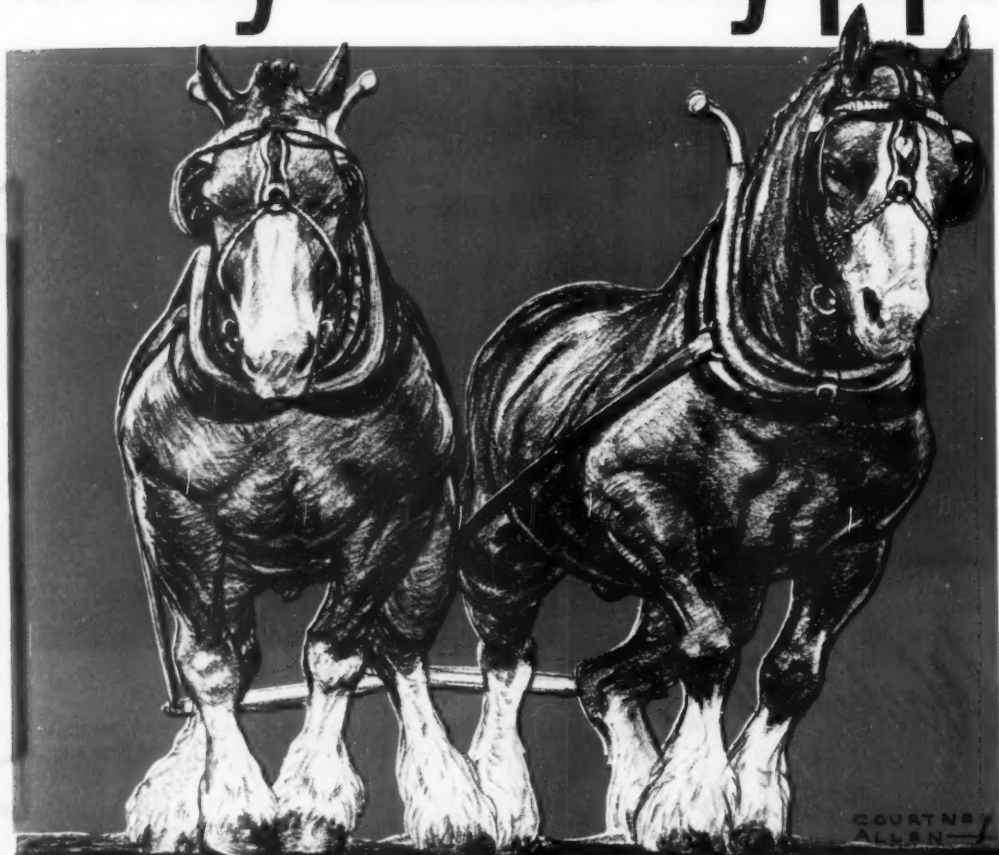
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in city streets lay pipe



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Known strength factors! Proved resistance to corrosion! These are your only safe and sure guides to long life and low maintenance expense of water, gas and sewer mains laid under costly modern pavements. The four strength factors that pipe must have to survive traffic shocks, heavy external loads, beam stresses and severe working pressures are listed on the page opposite. *No pipe that is deficient in any*

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known for **STRENGTH**

No pipe that is deficient in any of the following strength factors should ever be laid under paved streets.

CRUSHING STRENGTH

The ability of cast iron pipe to withstand external loads imposed by heavy fill and unusual traffic loads is proved by the Ring Compression Test. Standard 6-inch cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

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When cast iron pipe is subjected to beam stress caused by soil settlement, or disturbance of soil by other utilities, or resting on an obstruction, tests prove that standard 6-inch cast iron pipe in 10-foot span sustains a load of 15,000 lbs.

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The toughness of cast iron pipe which enables it to withstand impact and traffic shocks, as well as the hazards in handling, is demonstrated by the Impact Test. While under hydrostatic pressure and the heavy blows from a 50 pound hammer, standard 6-inch cast iron pipe does not crack until the hammer is dropped 6 times on the same spot from progressively increased heights of 6 inches.

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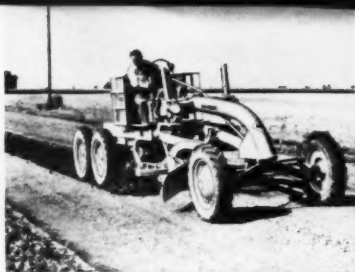
CAST IRON PIPE **SERVES FOR CENTURIES**



Maintains Roads and Streets



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Scarifies Toughest Surfaces

only the ALLIS-CHALMERS model

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WEIGHT — 8,500 lb. (bare)
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V OR BLADE-TYPE SNOWPLOWS Interchangeable, hydraulically operated. Blade plow may also be used for backfilling and light 'dozing.

SCARIFIER Mounts behind grader blade... makes full use of weight and traction... steering is positive, easier.

WINDROW ELIMINATOR Hydraulically controlled, saves extra passes by feathering out windrow left by grader blade.

Let your Allis-Chalmers dealer show you what the Model D can do for you

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

FOR GREATER PRODUCTION... FOR EASIER OPERATION... FOR SIMPLIFIED SERVICING



Slopes Banks — up to 2:1



Cuts and Cleans Ditches



Strips Sod

*can handle
so great a variety of jobs
— at a new low cost*



Finishes Between Forms



Grades Shoulders



Feathers Out Windrows



Levels Subdivisions



Works and Spreads Oil Mix



Loads Surplus Dirt



Handles Terracing



Plows Snow



Loads Snow

Nothing takes the place of
EXPERIENCE



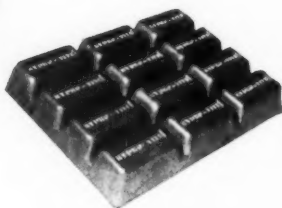
HYDRO-TITE

(POWDER)



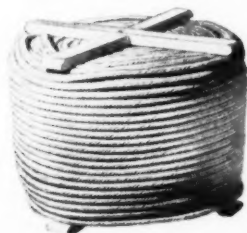
HYDRO-TITE

(LITTLEPIGS)



FIBREX

(REELS)



has joined more than a million miles of cast-iron water mains in the past 40 years with complete satisfaction—Used with FIBREX, the bacteria-free joint packing, it makes an unbeatable combination. All around the world NOTHING takes the place of HYDRO-TITE.

Free working samples on request.

HYDRAULIC DEVELOPMENT CORPORATION

Main Sales Office 50 Church Street, New York

General Offices and Works W. Medford Station, Boston, Mass.

For more details circle No. 102 on Readers' Service card



OKLAHOMA
Report No. 2703

On Bottom Land or Concrete Highways—

**"My 2-ton dump hauls
tough loads for only
3½¢ a mile"**

—Says L. C. CLINGAN,
Sand and Gravel Operator, Lawton, Oklahoma

He drove a 1950 Ford F-6 Dump
in Ford's nationwide Economy Run.
He says, "I proved for myself that
Fords are economical to run.
They carry more load on less gas."

Low cost hauling brightens the
profit picture on any construc-
tion job. And L. C. Clingan, who
owns three Ford Trucks and
kept cost records in Ford's
Economy Run, says—"In six
months, I hauled sand and gravel
on my F-6 a total of 25,271 miles,
making 1,566 stops. Average load
was 13,500 lbs. The total spent
for gas, oil and service was
\$882.49—or 3.49 cents per mile."

Like others who rely on Ford
to handle tough loads at low
cost, you'll also appreciate the
money-saving Ford Dealer serv-
ice. And, for more facts on the
trucks that last longer and save
you money every mile—mail
the attached coupon.



On the job every day, Clingan's
trucks help keep ready-mix con-
crete plants operating on schedule.
He says, "My Ford Trucks deliver
more loads by making three extra
trips in a day. I get more work
done per dollar."



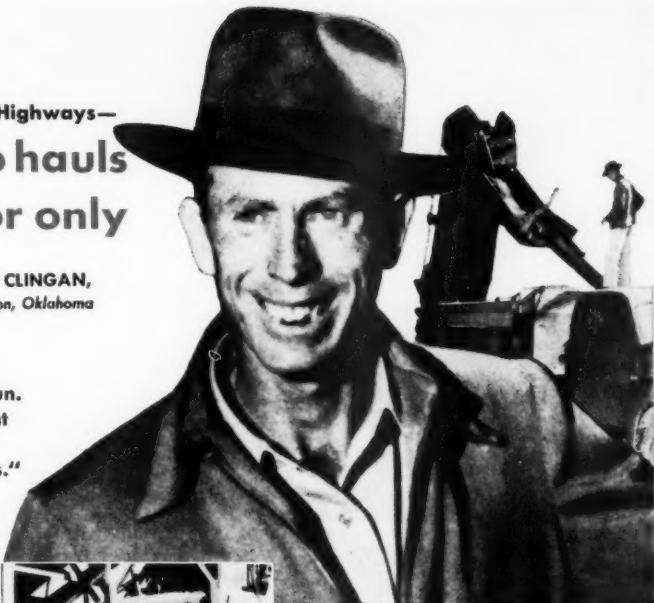
This new Ford F-6 Dump for '51,
like Clingan's truck, is built to fit
your power needs. Choice of 95-h.p.
Six, 100-h.p. V-8 or 110-h.p. Big Six.

Three wheelbases—134, 158 and 176
in. And remember, there's an eco-
nomical Ford Truck to fit your job
—over 180 models to choose from.

**Ford Trucking Costs Less Because—
FORD TRUCKS LAST LONGER**

Using latest registration data on 4,592,000 trucks, life insurance experts prove Ford Trucks last longer!

For more details circle No. 58 on Readers' Service card



POWER PILOT helps CONSTRUCTION MEN hold down hauling costs



The Ford Truck
Power Pilot is a
simpler, fully-
proven way of get-
ting the most power
from the least gas.

It automatically meters and fires
the right amount of gas, at precisely
the right instant, to match con-
stantly changing speed, load and
power requirements.

Unlike conventional systems, the
Power Pilot uses one control instead
of two, yet is designed to synchron-
ize firing twice as accurately. You
can use regular gas . . . you get no-
knock performance. Only Ford in
the low-price field gives you Power
Pilot Economy!

MAIL THIS COUPON TODAY!

FORD Division of FORD MOTOR COMPANY
3257 Schaefer Rd., Dearborn, Mich.

Send me without charge or obligation, de-
tail specifications on Ford Trucks for 1951.

Full Line ☐ Heavy Duty Models ☐
Light Models ☐ Extra Heavy Duty Models ☐

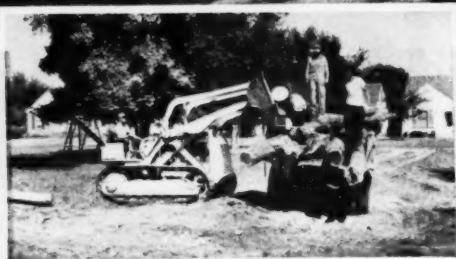
Name _____
(Please print plainly)

Address _____

City _____ Zone _____ State _____



USEFULNESS *Unlimited*



TRAXCAVATORS — Tractor shovels built tough for the rough jobs — can do hundreds of tasks with big savings in time — and — taxes. Operating with one-man crews, they will dig and load a variety of materials . . . clay, shale, sand, gravel, gumbo, shot rock, broken pavement, coal or snow.

TRAXCAVATORS — with matched-to-the-tractor balance, power and capacity — are tailor-made for city and county street and road work for clearing, building, rebuilding, maintenance of ditches and shoulders, etc. In addition TRAXCAVATORS landscape, level, grade, backfill, and handle general excavation.

TRAXCAVATORS — serving many communities on sanitary landfills — are contributing to public health and converting waste land into recreation areas or usable sites. Then machines carry out the complete refuse disposal cycle —

Ask the Village of Richfield, Minnesota about TRAXCAVATOR performance! A T4 TRAXCAVATOR handled their jobs so well that an HT4 was added. Here the HT4 carries out two of its year-round tasks that include removing trees, grubbing stumps, loading excess road material, grading, backfilling and snow-removal!

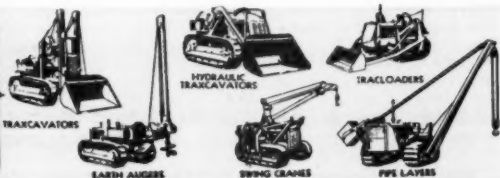
digging trenches, spreading and compacting refuse, covering and compacting the fill.

TRAXCAVATORS — backed by the facilities of TRACKSON-“Caterpillar” Dealers — pay for themselves quickly — and will continue to earn their way long years after book-depreciation has written them off.

TRAXCAVATORS — available in five, job-proved sizes — can be seen cutting costs in many a city near you . . . and your TRACKSON-“Caterpillar” Dealer will be glad to show you where. Stop in and see him . . . or write TRACKSON COMPANY, Dept. PW 41, Milwaukee 1, Wisconsin.

TRACKSON

TRACTOR EQUIPMENT



For more details circle No. 75 on Readers' Service card

LETTERS

TO THE
Editor

ENGINEERS NEEDED

While we have need for a limited number of young engineers, our greatest need at present is for sanitary engineers with five to fifteen years of experience. We have found it quite difficult to get these men and will appreciate any assistance that you may give us through PUBLIC WORKS.

We have vacancies for experienced sanitary engineers for assignment to public health missions to foreign countries and to current projects in the United States and Alaska. Appointments are made in grades from Assistant Sanitary Engineer (Lt., j.g.) to Senior Sanitary Engineer (Commander) with a salary range from \$4486 to \$7416 for officers with dependents. Additional allowances are provided for foreign service. Provision for dependent family members are available in most countries.

Richard J. Hammerstron,
Senior Sanitary Engineer,
Division of Commissioned Officers,
Public Health Service,
Washington 25, D. C.

NEWS FROM SO. AMERICA

Just a note to let you know I am being transferred from Bolivia to Costa Rica to open a new program in health and sanitation for the Institute of Inter-American Affairs. Below is my new address:

Paul S. Fox,
Chief of Party,
Institute of Inter-American Affairs,
American Embassy,
San Jose, Costa Rica.

A CONTRIB- UTOR WRITES

This is a note to thank you for the payment for the brief article recently submitted to you. So often we, as public officials, are asked by the Federal government and a multitude of other agencies for articles

GET READY FOR CIVIL DEFENSE

with
**MOBIL-
SWEEPER**



GETS STREETS CLEANER... AT LOWER COST

You can balance your street cleaning budget through the greater efficiency of a Mobil-Sweeper. Ten years of development bring you unsurpassed sweeping action. The longer draught arms on the rear pickup broom are "full-floating" in the true sense. Deepest dips get a clean sweep where ordinary sweepers would skip over refuse. You get a more thorough job on gutters because Mobil-Sweeper employs the "Decreased Arc" type gutter broom segment that retains its flipping action and gives hundreds of extra miles of clean sweeping. The 200-gallon water tank saves on stops for refills. *Don't be fooled on dirt hopper capacity...* be sure that your sweeper fills to its rated capacity

1
For decontamination of stricken areas, Mobil-Sweeper can scour miles of pavement, spraying 200 gallons of decontamination solutions per trip.

2
Keeping roads open and in usable condition is essential. Roads must be swept clean of debris injurious to tires.

3
Mobil-Sweeper's 55 m.p.h. speed permits it to make fast emergency trips or travel in military convoys to stricken areas. No other sweeper is as adaptable for emergency use nor as safe.



every time under normal operating conditions. Mobil-Sweeper fills its 23 1/2 cu. yd. hopper to the overflow every time—that's what counts. The powerful International Harvester engine lends itself to your standard type maintenance. Your operator is safer in Mobil-Sweeper with its shatterproof windshield, steel cab and 4-wheel hydraulic brakes. Write for details on how your community can save on street sweeping costs.

MOBIL-SWEEPER

DIVISION OF
THE CONVEYOR CO.
3260 EAST SLOAN AVENUE
LOS ANGELES 58, CALIF.

THE CONVEYOR COMPANY

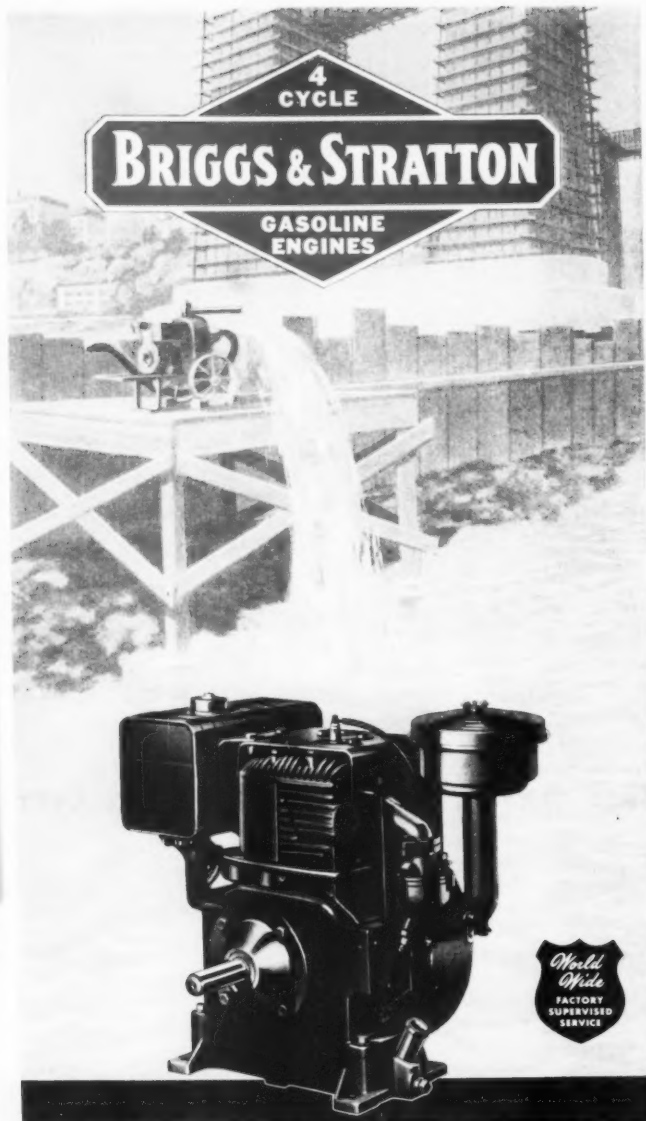
3260 East Sloan Avenue, Los Angeles 58, Calif.

PW-5

Gentlemen:
Please send catalog with complete details and specifications for the Mobil-Sweeper.

Name _____ Title _____
Address _____ City _____
County _____ State _____

For more details circle No. 23 on Readers' Service card



Preferred power for portable pumps and a wide range of other equipment for the construction industry — the world's most widely used single-cylinder gasoline engines on machines and tools for industry, construction, railroads, oil fields, etc., and on appliances and equipment for farm and home.

THERE are more Briggs & Stratton 4-cycle, air-cooled, single-cylinder engines in service than all other makes in their field combined.

Briggs & Stratton Corporation,
Milwaukee 1, Wis., U.S.A.

In the automotive field Briggs & Stratton is the recognized leader and world's largest producer of locks, keys and related equipment.

For more details circle No. 137 on Readers' Service card

on various public works matters, and without thanks. Your recognition of the efforts put forth is appreciated.

R. K. McGillivray,
Director of Public Works,
Bay City, Mich.

BOOKS IN BRIEF

BRITISH MANUAL OF WATER SUPPLY

Since early in 1948 more than a hundred experienced water engineers and other specialists have been at work preparing the Manual of British Water Supply Practice to cover the subject of water supply in all of its aspects. The results of this tremendous job are now available in a volume of 890 closely set pages of type with more than 100 illustrations. It is obviously impossible to review adequately such a work; and it is unnecessary to list the chapters, for all phases of water supply and purification are covered and, in addition, the volume "is of interest to meteorologists and geologists; chemists, bacteriologists and biologists; town planning officers; manufacturers and contractors. . ." The book, which will be a valuable addition to anyone's library, sells for 50 shillings and is published by W. Heffer & Sons, Ltd., Cambridge, England.

WATER TREATMENT

This excellent and complete text refers primarily to the conditioning and treatment of water supplies for industrial and similar uses, though domestic supplies are also covered. Specifically, this book deals with the impurities in water, such as chemical compounds, suspended solids, color, odor and taste, and the methods that are available for so treating the water as to make it suitable for a variety of commercial and other uses. By Eskel Nordell; 525 pages; Reinhold Publishing Corp., New York. \$10.

HIGHWAY FINANCE

The Bureau of Public Roads has compiled a "Selected Bibliography on Highway Finance." This provides about 1,400 references for the years 1939 to 1949 in the field of highway taxation and finance. The references are arranged under seven major topics—general, taxation, expenditures, borrowings, financial pro-

MORE than a family resemblance



Regardless of what size Oliver Industrial Wheel Tractor and Ware Loader you buy . . . "66", "77", "88" . . . you get the identical superior design and performance features in each.

The smaller tractor-loaders are not built down to a price level . . . they are built up to the same quality standards as the larger models.

In the tractors, you get the famous Oliver *plus* power and easy maneuverability that get you in and out of the rough spots . . . *fast!*

In the loaders, you get the same top features in each . . . hydraulically controlled bucket for greater "breaking out" action—full bucket loads

. . . hydraulically controlled discharge—easily and gently, fast or slow . . . mid-section pivot of the loader arms for longer reach of dumping position and correct weight distribution on tractor frames . . . simple, rugged design that eliminates unneeded dead weight . . . shock loads absorbed by hydraulic rams for longer tractor and loader life—lower maintenance.

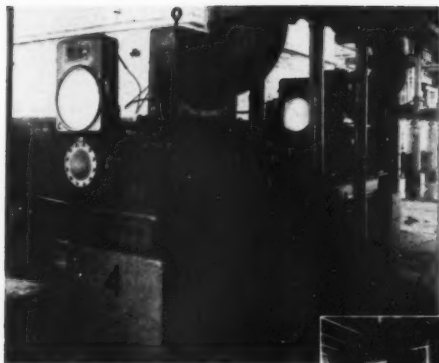
Your Oliver Industrial Distributor will be happy to show you what the "more than a family resemblance" in Oliver-Ware Tractor Loaders means to you in lower cost operation. And see the Oliver color film "Task Force on Wheels."

THE OLIVER CORPORATION

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio
A complete line of industrial wheel and crawler tractors

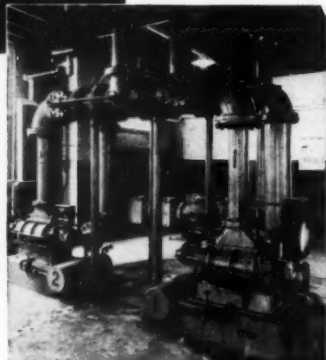


For more details circle No. 55 on Readers' Service card



Part of an installation of nine R-C Meters in a large plant, some of which date back 10 years or more. Capacities range from 3,000 cfm to 130,000 cfm.

YOU CAN ALWAYS **trust** R-C METERS



Continued repeat orders for R-C Positive Displacement Meters indicate the complete confidence of sewage treatment plant operators in the unvarying reliability of these units. Many have been installed so long that the original dates have been forgotten—yet they continue to measure as dependably as the day they were first put into service. That is because:

1. Accuracy is not affected by variations in specific gravity, rate of flow, pulsation, moisture, impurities or uncontrollable factors.
2. Accuracy is not subject to adjustment of meter or recorder by operators or other persons.
3. Accuracy is not affected by reasonable overloads.
4. Accuracy is permanent because measuring chambers are surrounded by precision-machined, cast iron surfaces.

Compactness of R-C Meters permits installation in cramped spaces. Sizes from 4,000 cfm to 1,000,000 cfm provide range for all sewage treatment applications. Indicating and recording devices are available. Ask for details in Bulletin 40-B-14 or write us about your needs.

ROOTS-CONNERSVILLE BLOWER CORPORATION
510 Poplar Avenue, Connerville, Indiana

ROOTS-CONNERSVILLE

ONE OF THE DRESSER INDUSTRIES



For more details circle No. 122 on Readers' Service card

grams and plans, miscellaneous topics, and statistics. Brief annotations accompany most of the entries to indicate the general nature of the content, but evaluations are not attempted. 108 pages. For sale by Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 55 cents per copy.

AMERICAN ROADS

Five hundred years ago the only roads in this country were Indian trails. Today there are three million miles of roads, not all of them in the condition that highway engineers would like to have them. The story of how these roads were built, and why, is told in a non-technical interesting and easy-to-read fashion. 243 pages, 42 photographs and 4 maps. By Val Hart; published by William Sloane Associates, New York 19, N. Y. \$3.

WELDED BRIDGES

This book is devoted exclusively to the information obtained from the designs entered in the 1949 "Welding Bridges of the Future" program by the James F. Lincoln Arc Welding Foundation. It incorporates and makes available to engineers the good ideas resulting from that program. All designs are based on an all-welded 2-lane deck bridge supported on two end piers 120 ft. apart, but designs differ greatly in respect to structural type of longitudinal members and the kind of floor system. It is edited by James G. Clark, University of Illinois. 247 pages; well illustrated with drawings. We have no information on its cost. Order direct from James F. Lincoln Arc Welding Foundation, Cleveland 1, Ohio.

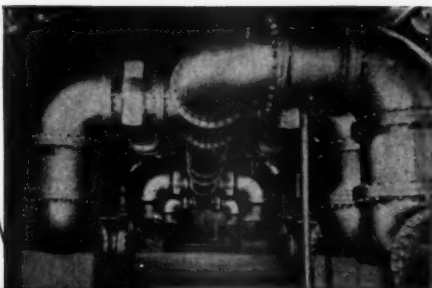
PREPARING REPORTS

Prepared primarily to train engineers in writing scientific papers and reports, this 450-page book contains more than 100 specimens of actual prints, graphs, letters and other helps. Authors are Frank Kerekes, assistant dean of engineering, and Robley Winfrey, professor of civil engineering, both of Iowa State. The book sells for \$6.90. Iowa State College Press, Ames, Iowa.

SURFACE DRAINAGE

This is one of the fine committee reports of the Highway Research

... fully enclosed
pipe gallery



Again it's **Roberts Filter!**

**THE RIO GRANDE DE LOIZA
DEVELOPMENT — OUR SEVENTH
SERVING THE GREATER
SAN JUAN AREA**



... interior view
of control tables

in cooperation with

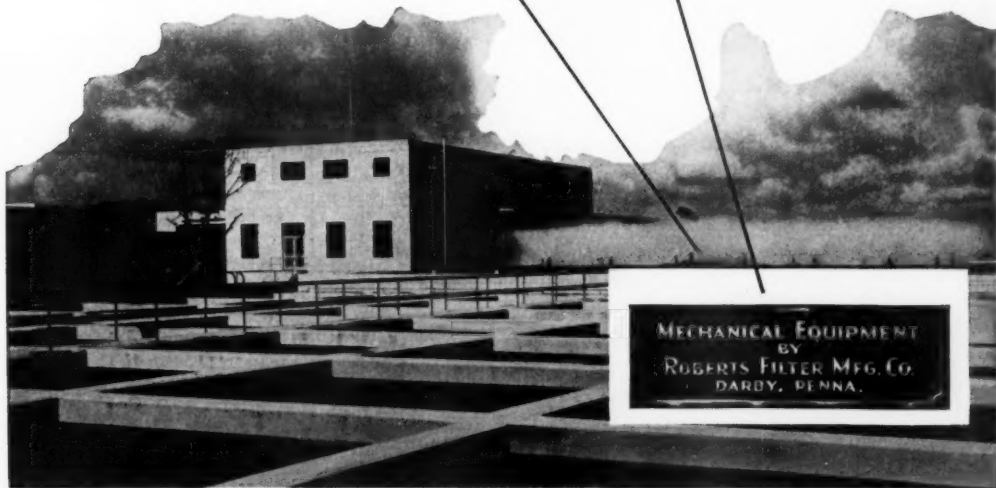
SERGIO CUEVAS
Executive Director of Puerto Rico
Aqueduct and Sewer Authority

BUCK, SEIFERT, and JOST
Consulting Engineers
New York

"THE PRIDE OF THE ANTILLES"

Another triumph of progress
and engineering skill was
marked during the recent opening
of the Puerto Rico Aqueduct and Sewer Authority's
colorful Rio Grande De Loiza filter plant.

Roberts Filter is proud
to have taken part in this
30 million gallon per day project
—seventh with which we have been
identified over a period of 35 years
in the historic San Juan area.



**MECHANICAL EQUIPMENT
BY
ROBERTS FILTER MFG. CO.
DARDY, PENNA.**

For more details circle No. 109 on Readers' Service card

You can't jam the new RIGGID 65R

Really streamlined pipe
threading with this RIGGID
self-contained die stock



Right Here is the
simple device that
makes 65R auto-
matically JAM-
PROOF.

● You don't have to watch it—lead screw can't jam on workholder. New jam-proof drive plate automatically kicks out driving ratchet pawl when standard length thread is cut. Your recent model 65R easily converted—just buy new drive plate, put in place of old plate. Perfect threads on 1" to 2" pipe with one set of 4 high-speed steel dies—sets to pipe size in 10 seconds, mistake-proof self-centering workholder sets instantly! Buy the new jam-proof RIGGID 65R at your Supply House.

RIGGID

★ Work-Saver Pipe Tools ★

THE RIGGID TOOL CO., CLEVELAND, OHIO

PUBLIC WORKS for April, 1951

Board. Essential information on drainage engineering is presented. It includes a report on Flood Frequency by Tate Dalrymple; Surface Runoff from Agricultural Watersheds by W. H. Potter; and Tentative Results on Capacity of Curb Opening Inlets. 90 cents per copy from Highway Research Board, Washington 25, D. C.

PRESSURE PIPING

The 1951 Code for Pressure Piping has been issued by the American Society of Mechanical Engineers, 29 West 39th St., New York. It covers most all types of piping—power, water, gas, etc. For sale by the Society for \$3.50.

MILLARD F. CALDWELL, JR.

Appointed on Dec. 1, 1950, as director of the Federal Civil Defense Administration, Mr. Caldwell has had long experience in public service. A native Tennessean, and a graduate of the Universities of Mississippi and Virginia, he moved to Florida in 1925. He was city attorney of Milton, Fla., prosecuting attorney and county attorney for Santa Rosa County, and a member of the State Legislature from 1928 to 1932. He was elected to Congress in 1933 and served there six years before voluntarily retiring to resume his law practice.

He was elected Governor of Florida in 1945 and held that office until 1949, since which time he has been engaged in his private law practice. He is 53 years old. He and Mrs. Caldwell, the former Mary Rebecca Harwood, have two daughters, Sally and Susan. The Caldwells are now residents of Tallahassee.

Mr. Caldwell is shown on our front cover as he was taking the oath of office last fall.



for Yourtown, U.S.A.

Whatever Yourtown, U. S. A., needs in power, International is the source, with mighty crawler tractors . . . nimble wheel tractors . . . rugged engines and power units.

It takes tools to run a city, and power to run the tools.

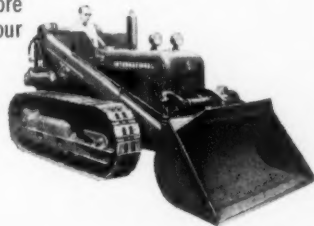
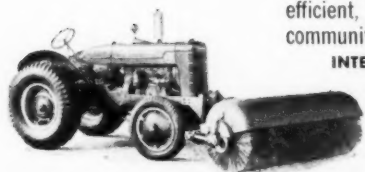
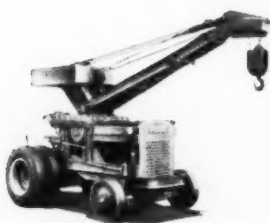
Brute, rugged "Power on Tracks" for sanitary fill, and for wrecking, digging, building.

Handy, sturdy "Power on Wheels" for all maintenance jobs.

Reliable "Power on the Job" engines for a hundred and one municipal requirements.

They're backed by the top-notch service facilities of your International Industrial Distributor. And they all add up to "Power that Pays" — in more efficient, reliable, economical running of your community's complicated life.

INTERNATIONAL HARVESTER COMPANY
CHICAGO 1, ILLINOIS



INTERNATIONAL



POWER THAT PAYS

For more details circle No. 139 on Readers' Service card

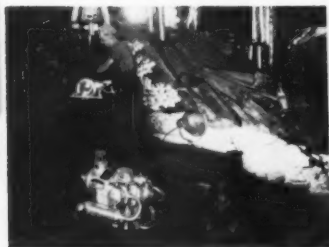
Ready for emergencies—any emergency

HOMELITE



Carryable PUMPS GENERATORS and CHAIN SAWS

No matter what the emergency . . . a storm, a flood or anything else . . . you'll need, as history has proved, Homelite Carryable Pumps, Generators and Chain Saws. Fully mobile, easily carried by one man, these gasoline-engine-driven units, give you a highly flexible means of repairing damage and restoring safety in the fastest possible time.



For all types of emergency lighting. With Homelite Carryable Gasoline-Engine-Driven Generators, you can operate brilliant floodlighting for urgent night repairs. You can supply power to restore telephone or other communications paralyzed through loss of normal power. You can supply electricity for hospitals, relief centers, or other urgent requirements until normal power is restored.



For flooded buildings or fighting fires. Homelite Carryable Pumps can be rushed to any flooded area, to pump out cellars fast. Each pump handles up to 15,000 gallons per hour. Pumps water thick with debris without clogging. Can be used also for fighting isolated fires, with water pumped from nearby wells, brooks, rivers or ponds.



For cleaning up the damage. Every disaster leaves a trail of damage. Fast clearing of this damage is essential . . . to rescue lives and to facilitate repairs. Have Homelite Gasoline-Engine-Driven or Electric High Cycle Chain Saws handy for this work. With one of these saws, one man can do more work than two men . . . and much faster.

CARRYABLE

**PUMPS • GENERATORS •
BLOWERS • CHAIN SAWS**



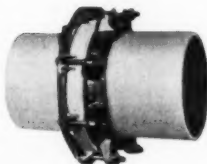
For more details circle No. 185 on Readers' Service card

EMERGENCY REPAIRS

Here are 6 safe, sure ways to repair damaged lines quickly

It is no more than prudent to be prepared to handle emergency damage quickly and effectively. Many cities are seeing to their stocks of the Dresser products illustrated here, knowing that even unskilled civil defense volunteers can install them with a minimum of training. Resilient rubber gaskets provide lasting protection against vibration and shock.

Be sure you have complete information on these products and their use. See your Dresser Sales Engineer or write to our Bradford Office for details.



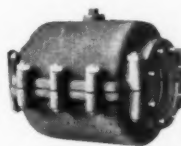
Dresser Bell-Joint Clamp (Style 60) makes permanent, flexible repair on blown or leaking bell and spigot joints. Fully adjustable. High uniform gasket pressure. Sizes 3" to 60".

Dresser "Adjustable" Sleeve (Style 82) makes quick, permanent repairs on cast iron lines. Light in weight, low in cost. Adjustable for perfect fit. Sizes 4" to 8".



Dresser Split Sleeve (Style 57C) for repairing breaks, splits and holes in cast iron pipe. Ruggedly built. Sizes from 2" to 12".

Dresser Coupling (Style 38) makes it easy to cut in a new length of pipe to replace a damaged section. The only tool needed to install it is a wrench. Sizes $\frac{3}{8}$ " to 72" and up.



Dresser "Bell-Pack" Sleeve (Style 126) encloses split and broken bells, mechanical joints. Factory assembled, ready to use. Sizes 3" to 24".

Dresser "Super-Service Fittings" (Style 90) is extremely rugged joint for service lines. Flexible— withstands vibration and shock. Complete line including ells, tees, adaptors. Sizes from $\frac{3}{4}$ " to 2".



DRESSER COUPLINGS AND REPAIR PRODUCTS

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. (One of the Dresser Industries)—
Warehouses: 1121 Rothwell St., Houston, Texas;
101 S. Bayshore Highway, South San Francisco,
Cal.—Sales Offices: New York, Philadelphia,
Chicago, Houston, South San Francisco.

Gentlemen: Please send full information on Dresser Products for emergency repairs.

Name _____

Position _____

Address _____

City _____ Zone _____ State _____

Progressive Civic Officials are Getting the Facts About...

Hotpoint's *Municipal Plan of Food-Waste Disposal*

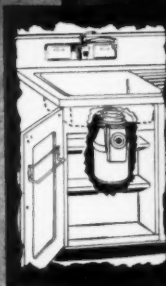
Modern-minded municipal officials are investigating the Hotpoint Municipal Plan of Food-Waste Disposal. Highly satisfactory reports from numerous communities, which have dispensed with the "can and wagon" garbage collection system, prove the values in the Hotpoint plan.

Study these advantages made possible by the Hotpoint Disposall® Food-Waste Disposer. If you would like to provide your community with a modern, sanitary, economical method of disposing of food-waste before it becomes garbage, Hotpoint will gladly present the Hotpoint Municipal Plan—based on experience and written specifically for municipal officials.

- A convenient, new and modern food-waste removal system.
- Health protection to the members of all families.
- Fly and rat pest reduction.
- Garbage collection cost reduction.
- More digestion gas for use and sale.
- Elimination of food-waste before it becomes garbage.
- Elimination of alley garbage can.
- Elimination of garbage collection problems.
- Elimination of garbage odors.
- True sanitation for your town.

And—it saves you money!

Write to Hotpoint Disposall Dept., 5600 West Taylor St., Chicago 44, Illinois, for all the facts.

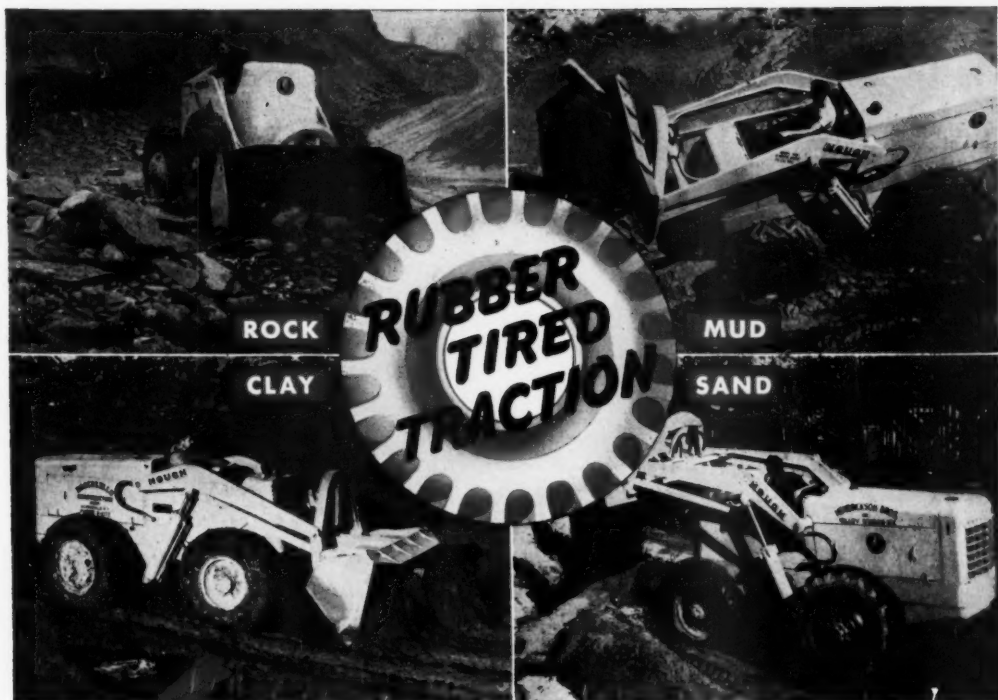


The Hotpoint Disposall food-waste disposer is easy to install in any sink... convenient... safe... odorless and economical. Simple to operate... keeps kitchens, sinks and hands clean. Does not overload or clog sewer systems. Can also be used with septic tank.

Hotpoint Inc.

(A General Electric Affiliation)

5600 West Taylor Street, Chicago 44, Illinois



4^{wheel} drive **PAYLOADER** *Traction-Speed-Mobility*

You get more of everything with this rubber-footed tractor-shovel. With its combination of 4-wheel drive and large pneumatic tires the Model HM PAYLOADER gives you fast-action traction on all kinds of footing — on sand, stone, snow, clay or mud. It gives you crawler-like traction at far less maintenance expense, **PLUS** speed when you want it and the ability to work on pavements and travel over streets and highways at 16 M.P.H.

You also get easy operation and maneuvering speed thanks to power-assisted steering and full reversing transmission with 4 speeds reverse as well as forward. Once you see one in action you'll know why hundreds of contractors as well as road and street officials are highly satisfied users of Model HM PAYLOADERS. Full information on this and other sizes of PAYLOADERS is yours for the asking. The Frank G. Hough Co., 761 Sunnyside Avenue, Libertyville, Illinois.



WRITE for literature on any size PAYLOADER: the 1½ yard Model HM; the 1¼ yard HY; the ¾ yard HF; the ½ yard HE; the 12 cu. ft. HA. There is no obligation.



PAYLOADER®

THE FRANK G. HOUGH CO. • Since 1920



For more details circle No. 107 on Readers' Service card

For Better Trickling Filter Results



Type 15" MH AMERICAN Rotary Distributor at Whittier, Calif.

1. Use TFF Institute SPECIFICATION Underdrains

Trickling Filter Floor Institute *specification* underdrains are used in all modern filters where better results and trouble-free operation are desired. They are scientifically designed for that purpose and made of the finest quality vitrified clay. The size of the top openings insures proper ventilation of all the filter media and free discharge of the filter effluent. The run-off channels are extra smooth for non-clogging, quick drainage.

These blocks will carry applications up to 50 MGAD. Unskilled labor can lay them easily because they are light-weight and self-aligning. And the blocks are strong enough to work on after laying and to support safely even very deep filter media. They are best for all kinds and shapes of filter.

On your next filter, use the best equipment you can get . . . and give it a *specification* floor of *Vitrified Clay Filter Bottom Blocks*. Ask any member of this Institute for full engineering details. Write today.

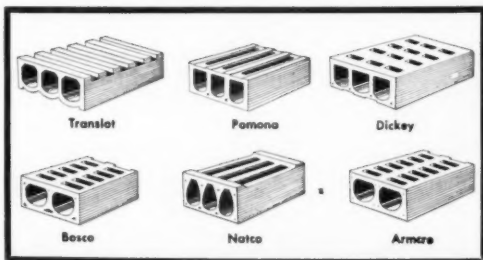
These one-piece blocks
are: Easy to Lay, Acid Resistant,
Proved by Use, Won't Clog.

2. Use Good Equipment

Since its founding in 1868, American Well Works has been a continuous supplier of high quality equipment for water supply and sewage treatment. An important feature of its products is flexibility of design. Each piece of equipment can be adapted to varying requirements. The 83 years of experience in equipment engineering has made the name AMERICAN synonymous with dependability.

Among their many rotary distributor installations are two at Whittier, Calif. These are Type 15" MH AMERICAN Positive Drive for filter beds of 165' dia.

Mr. M. Bowen, City Engineer, who designed this plant installed a *specification* floor of *Vitrified Clay Filter Bottom Blocks* . . . the best kind of filter floor available.



TRICKLING FILTER FLOOR INSTITUTE

Pomona Terra-Cotta Co.
Pomona, N. C.

Texas Vitrified Pipe Co.
Mineral Wells, Tex.

W. S. Dickey Clay Mfg. Co.
Kansas City 6, Mo.

Ayer-McCord-Reagan Clay Co.
Brazil, Ind.

National Fireproofing Corp.
Pittsburgh 22, Pa.

Bowenston Shale Co.
Bowerston, Ohio

For more details circle No. 20 on Readers' Service card

This **GRIFFIN****EMERGENCY**

TRAILER - type

Power Plant...furnishes **LIGHT and POWER**
instantly, - **anywhere!**

An ideal standby unit
for municipal and city
public works departments . . .

A must for CIVIL DEFENSE!

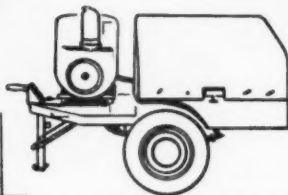
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EQUIPMENT CORPORATION

881 East 141st Street, New York 54, N. Y.

Simply hook the GRIFFIN HIGH-LIGHT TRAILER to a car or truck and your portable power house is ready to bring light and electric power into remote areas. Cities and municipalities will find it indispensable for night operation on highways and for sewer or water line repairs or when power lines fail. Will provide power for electric tools as required.

The GRIFFIN HIGH-LIGHT TRAILER is delivered ready for immediate service.



A **MODEL** FOR EVERY EMERGENCY NEED

**6.3 KVA**SINGLE PHASE A.C. 60 CYCLE
120 VOLTS — FOR LIGHT**7.5 KVA**SINGLE PHASE A.C. 60 CYCLE
120 VOLTS — LIGHT AND POWER

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Please send HIGH-LIGHT information checked:

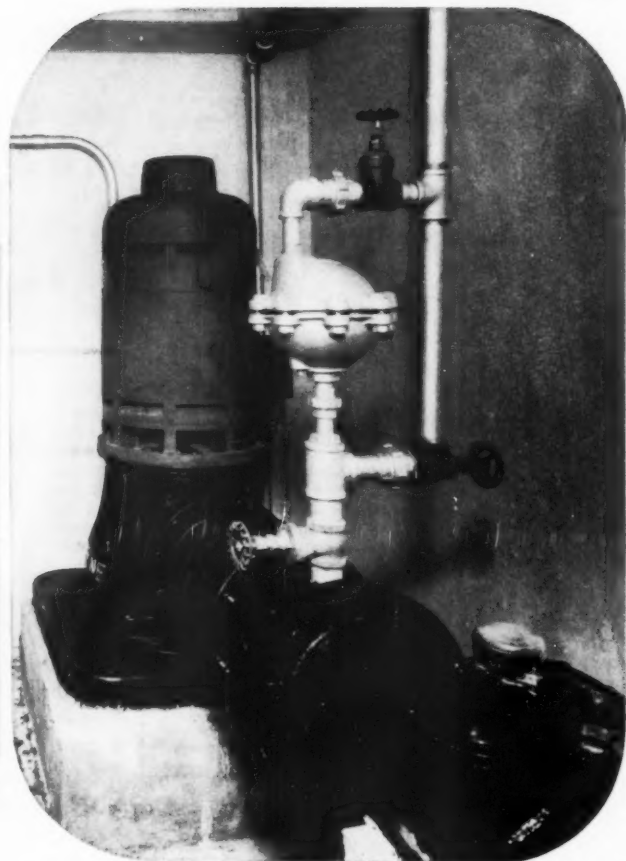
- ☐ 6.3 KVA HIGH-LIGHT TRAILER FOR LIGHT
☐ 7.5 KVA HIGH-LIGHT TRAILER FOR LIGHT AND POWER

Name.....

Address.....

City.....

42 Wells—All by Layne SERVING WICHITA, KANSAS



**AT THE MIAMI
AWWA
CONVENTION
SPACE 120-121**

The Layne pumping equipment for Wichita has made an amazingly fine record of good service. In 9 years of heavy load service, the only repairs needed was a relatively small item—6 new air lines. Well No. 1 operated day and night with no shutdown for 121 days—producing over 180,000,000 gallons of water.

Layne
WELL WATER SYSTEMS
VERTICAL *Turbine* PUMPS

For more details circle No. 173 on Readers' Service card

THE NATION'S 2ND LARGEST MUNICIPAL USER OF GROUND WATER

In 1938, Layne installed twenty-five top performing well water units to give Wichita 48 million gallons of water daily,—enough so city officials estimated, for all needs until 1960. Then came World War II and Wichita gained many new industries and a big growth in population. The demand for water quickly became greater than the supply.

Surveys indicated that some thirty miles northwest of the city, The Equus beds offered a thousand square miles of water bearing formations. Again Layne was called in and was given a contract for seventeen new wells to be completed without delay. Layne crews swung into action. They drilled the wells, set casing, sand screen and pumps. Including testing time, a new well was completed every nine days until all seventeen were in service, increasing Wichita's total supply to 62½ million gallons per day,—more than enough for all domestic and industrial needs.

Whether for an emergency, or for normal needs, Layne is always in a position to do an outstanding job in the development of ground water for any purpose. For further information, catalogs etc., address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tenn.

LAYNE ASSOCIATED COMPANIES

ASSOCIATED COMPANIES—Layne-Arkansas Co. Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ The Layne-Texas Co., Ltd., Houston, Tex. ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Minnesota Co., Minneapolis, Minn. ★ International Water Corp., Pittsburgh, Pa. ★ International Water Supply, Ltd., London, Ont. ★ Layne-Hispano Americana, S.A., Mexico, D. F. ★ General Filter Company, Ames, Iowa.

Looking for efficient, LOW-COST SCREENINGS REMOVAL?

Immediate, overwhelming acceptance proves new LINK-BELT Thru-Clean Bar Screen the answer for handling screenings from sewage and industrial wastes

YES, 36 new Thru-Clean Bar Screens were sold in the 12 months following Link-Belt's initial announcement! Take a look at the partial list of installations and the consulting sanitary engineers who were responsible for them.

Then look at the advanced engineering illustrated by the photos below. They suggest how this new Link-Belt development can solve the problem of removing screenings from sewage or industrial wastes in your plant.

You can get the complete story by calling your nearest Link-Belt office. Or write for Folder No. 2327.

A FEW USERS OF THRU-CLEAN BAR SCREENS

Location

Nassau County, N. Y. Greeley & Hansen
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Port Huron, Mich. Drury, McNamee & Porter
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Storm Lake, Iowa. Buell & Winters
Camden, N. J. Havens & Emerson
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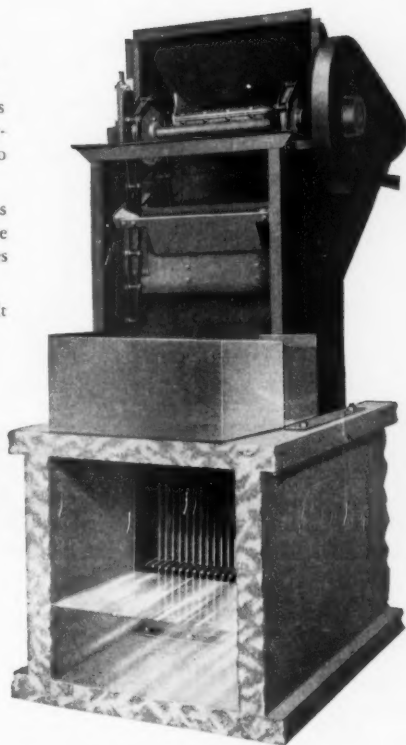
Sanitary Engineer

LINK-BELT

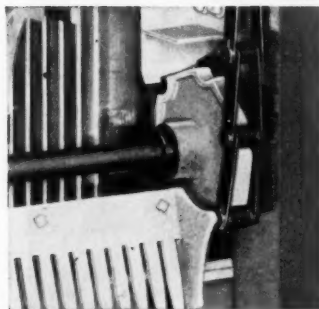
SANITARY ENGINEERING EQUIPMENT

LINK-BELT COMPANY: Philadelphia 40, Chicago 9, Indianapolis 6, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities.

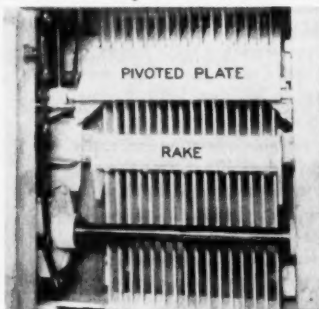
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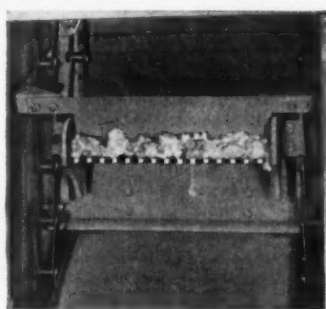
How rakes automatically clean bars "from the back"



Segmented steel rake is about to start its low-friction vertical movement. Entering from downstream side (*shown*), its forward and upward force precludes jamming or clogging. Travel starts at lowest point of channel, catches all solids retained by screen.



Cold-rolled steel bars, uniformly spaced, form screen. They are rigidly fixed at bottom of channel, extend only 6 in. beyond pivoted plate immediately above high water level. Simple, rugged construction minimizes maintenance. Low speed cuts power consumption.



Hinged wiper blade thoroughly cleans rake fingers, deposits screenings in trough for removal to shredder, disposal can or incinerator. Note the heavy, long-pitch Link-Belt chains, selected for trouble-free long life and assurance of proper travel for rakes.

For more details circle No. 319 on Readers' Service card

★ THE SELF-LOADER WITH ELBOW ACTION

HOLMES OWEN LOADER

DRIVER LOADS, HAULS and DUMPS

SOLVES Many JOB Problems

VERSATILE ONE-MAN OPERATION SAVES Time - Manpower - Equipment

The new Holmes-Owen Loader offers a very practical solution to many of the problems which state, county and city officials are now facing in providing increased community services.

The new self-loader provides the answer to such problems, for this equipment converts the usual dump truck into an independent working unit capable of performing a wide variety of work. It saves time, labor and the use of more costly equipment by permitting the truck driver to do his own light digging, grading, loading, and cleaning-up.

A dump truck with such versatile one-man operation can easily do the work of several men, thereby drastically cutting the cost of many jobs, such as: the handling of various stock pile materials, removal of debris, trash, snow, etc., cleaning-up of streets, intersections, parkways, etc. Let us show you how a Holmes-Owen Loader will solve your work problem. Ask your equipment dealer for details or write factory direct.

Manufactured by

Developers of HOLMES WRECKER Equipment

ERNEST HOLMES COMPANY, Chattanooga, Tenn.



DRIVER controls digging and loading operation from cab.



One-man operation speeds up LOADING, HAULING and UNLOADING.

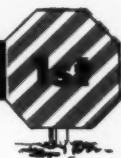
First of Series of ads giving

TIPS on TUBE USE

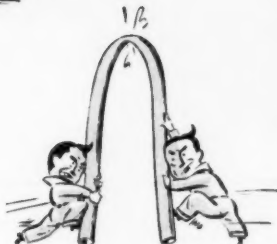
to help conserve copper water tube



HOW TO BEND TUBE



... let us caution you not to bend tube with rapid motion. Such action usually kinks the tube. Don't sacrifice your time and tubing much less your reputation—for speed.



TO BEND TUBE PROPERLY



... grasp it in both hands with thumbs spaced about three inches apart, sliding the thumbs toward each other as you bend the tube. Repeat this until tubing assumes desired shape. A half dozen times—exerting an even pressure each time—is usually sufficient to bend a $\frac{3}{8}$ " tube. When bending a larger tube, start with hands farther apart and work the tubing to the required shape more slowly.

Choose good tube first—care makes it last.

WOLVERINE TUBE DIVISION

Calumet & Hecla Consolidated Copper Company

INCORPORATED

Manufacturers of seamless, non-ferrous tubing

1451 CENTRAL AVENUE • DETROIT 9, MICHIGAN

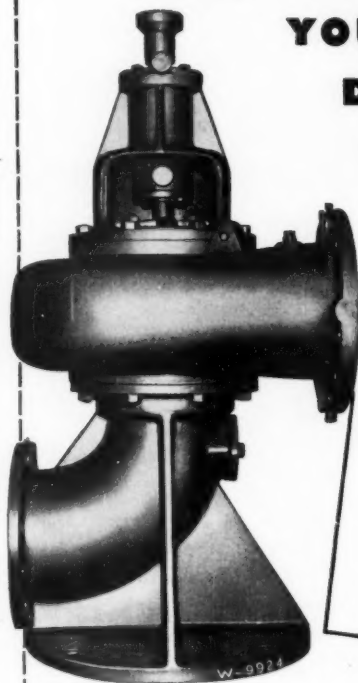
Plants in Detroit, Mich. and Decatur, Ala.



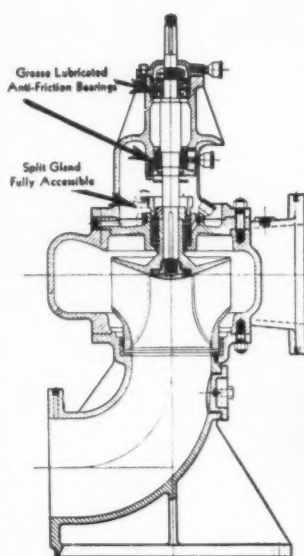
Buy From Your Wholesaler

Export Department, 13 E. 40th St., New York 16, N. Y.

There's a Mixflo Pump THAT WILL MEET YOUR SEWAGE DISPOSAL NEEDS— *Exactly!*

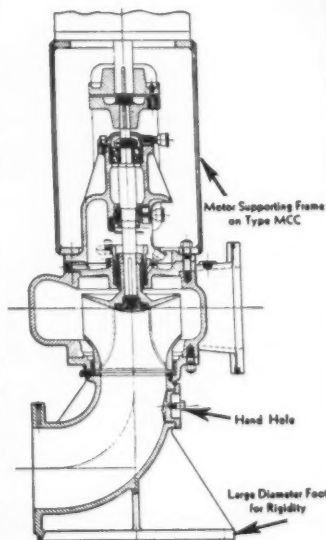


*Worthington
Offers The
Largest Selection
Of Sizes
And Types In
A Single Line*



Type MCV
(Motor separately mounted)

Mixflo, Type MCV
with base elbow suction nozzle



Type MCC
(Motor close mounted)

Non-clogging two-vane closed impellers, grease-lubricated anti-friction bearings, easy accessibility to the split stuffing-box gland and impeller eye . . . are typical of the many Worthington Mixflo features assuring low-cost, trouble-free sewage pumping.

No Need To Guess!

And along with performance-proved excellence in every mechanical and hydraulic detail, the Mixflo line offers you the widest choice of sizes and types in the field. So there's no need to compromise on a pump that's "about" right — you're sure to find a Mixflo that's *exactly* right for your particular requirements.

Bulletin W-317-B16 describes the various Mixflo types made in 10", 12" and 16" sizes. Worthington also builds Mixflos in sizes up to 84", with open or closed impellers and for horizontal or vertical drives. For more Mixflo facts that prove *there's more worth in Worthington*, contact our nearest District Office. Or write to Worthington Pump and Machinery Corporation, Harrison, N. J.



WORTHINGTON



W.O.3

For more details circle No. 201 on Reader Service card



CUTS CATCH BASIN CLEANING COSTS 60% for Milwaukee Sewer Department

FIGURES show that the Milwaukee Sewer Department has reduced catch basin cleaning costs by over 60 percent since switching from hand labor to a Bucyrus-Erie Hydrocrane. Equipped with an orange-peel type hydraulic catch basin cleaner, the department's Hydrocrane cleaned out an average of 30 catch basins per day—even under adverse winter conditions.

In addition to cutting costs, the Hydrocrane does a much better catch basin cleaning job. In fact, the entire operation is more sanitary because the crane loads directly to trucks, while hand laborers formerly piled the muck on the street first.

The Milwaukee Sewer Department also uses its Hydrocrane for excavating manholes, catch basins and trenches for storm overflow connections. Here the crane has reduced costs by 30 percent.

Find out how this versatile, fully hydraulic crane can save money on your sewer jobs. Two sizes—2-ton $\frac{1}{4}$ yd.; 3-ton $\frac{3}{8}$ yd. Send the coupon today.



Here is the modern, sanitary way to clean catch basins. Notice the big load. This bucket removes dirt, stones, twigs, glass and other debris in short order.



BUCYRUS-ERIE HYDROCRANE DIVISION
South Milwaukee, Wisconsin

Gentlemen:

I want the full story on the Hydrocrane.

Name

Company or Dept.

Address

City

State

BUCYRUS-ERIE HYDROCRANE DIVISION, South Milwaukee, Wisconsin

73H90

For more details circle No. 245 on Readers' Service card



*There are
more ways
than one
to get rid of*

IRON AND MANGANESE



Iron and manganese are unpleasant impurities in water. They cause stains that interfere with industrial processes, and also make the water undesirable for household use.

Now Permutit's modern equipment eliminates these two water nuisances. You can remove iron and manganese in any of three ways: by base-exchange; by aeration, settling and filtration; or by oxidation through manganese zeolites. Find out which is best for your community... write for full information to The Permutit Company, Dept. PW4, 330 West 42nd Street, New York 18, N. Y., or to Permutit Company of Canada, Ltd., 6975 Jeanne Mance Street, Montreal.

Water Conditioning Headquarters for Over 36 Years

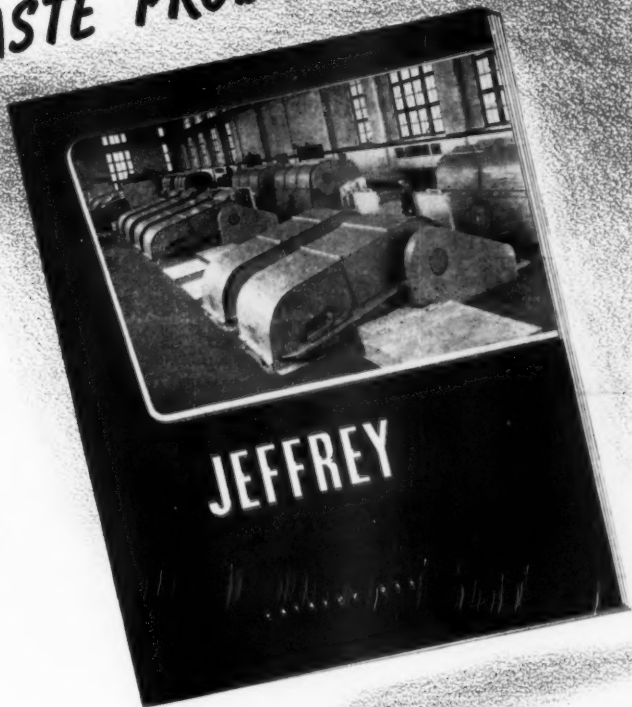
PERMUTIT

IF YOU ARE FACED
WITH A WASTE PROBLEM

...get this
new catalog

Contains New Engineering Data
and a hundred photos and draw-
ings covering:

Screens
Grinders
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Sludge Collectors
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It's complete . . . packed with useful information
. . . profusely illustrated. Catalog No. 833 goes
into detail, covering modern methods for modern
treatment. All the information you need under one
cover. Send for your copy.

THE JEFFREY

MANUFACTURING COMPANY

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Jeffrey-Gallon (Pty.) Ltd., Johannesburg, S.A.

The Ohio Machine & Iron Co., Columbus, Ohio

British Jeffrey-Diamond Ltd., Wakefield, England

The Gallon Iron Works & Mfg. Co., Gallon, Ohio

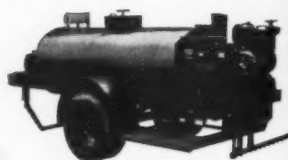
The Gallon & Iron Works Co., Gallon, Ohio

Complete Line of
Material Handling,
Processing and
Mining Equipment



For more details circle No. 191 on Readers' Service card

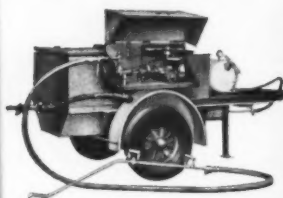
LITTLEFORD means low-cost road repair



model 101
**UTILITY
SPRAY
TANK**



When roads need repair, there is no Utility Black-Top Unit with the versatility of a Littleford 101 Utility Spray Tank. If you wish to use a Hand Spray for large patch jobs, it's available; if small application work is needed, there is a 10 ft. Spray Bar to do the work; and for crack filling and small patch work, there's a Pouring Pot Outlet. The 101 is a combination of three units in one. Write for Bulletin No. 5.



model 84-HD
**TAR AND
ASPHALT
KETTLE**



With a Motor Spray Attachment, the 84-HD Kettle is the most modern black-top road patching unit on the market. The labor saved in operating this kettle makes it the lowest cost unit ever designed for Road or Runway work. One man is all that's necessary for operation. 84-HD Heats faster and Sprays faster, operates more efficiently. Write for Bulletin No. 1.



LITTLEFORD

LITTLEFORD BROS., INC.
452 E. Pearl St., Cincinnati 2, Ohio

For more details circle No. 41 on Readers' Service card

Announcing

We take pride in announcing the resumption of pressure pipe manufacturing in our new, completely modern plant located in Anniston, Alabama. This plant produces Super de Lavaud Cast Iron Pipe, centrifugally, in modern long lengths.

General Sales Offices ANNISTON, ALA.

Inquiries addressed to our nearest sales office will be appreciated.

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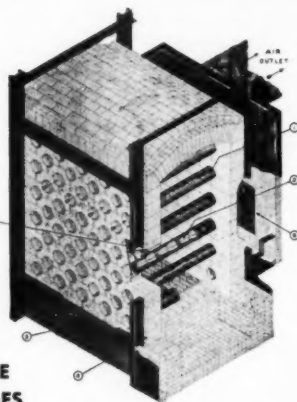
350 Fifth Avenue
New York 1, N. Y.

ALABAMA PIPE COMPANY
ANNISTON, ALABAMA

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first step to a better incinerator . . .

**FITCH
AIR
HEATERS**



CHECK THESE 6 ADVANTAGES

1. Improved silicon carbide heat transfer elements (tubes) greatly increase the life of the recuperator.
2. Fireclay corebusters keep the air in intimate contact with the tube walls and provide additional heating surface.
3. Special recesses for caulking the tube ends and wall block joints assure minimum leakage and maximum efficiency.
4. Special "keyed" end wall blocks reduce leakage and aid in keeping the terminal walls in alignment.
5. Convenient access for ash removal from the dust pocket.
6. Manholes permit convenient replacement of individual tubes without disturbing the balance of the recuperator structure.

Bulletin No. 14 explains why.
Address:

FITCH RECUPERATOR COMPANY
PLAINFIELD, N. J.

For more details circle No. 215 on Readers' Service card

we've split
the case
wide open...



... for proof of better pumping performance!

It's been said that split-case centrifugal pumps look pretty much alike. But looking alike does not mean "like" performance!

We've lifted the casing of a Fairbanks-Morse Single-Stage Split-Case Centrifugal to show you why you get *better* performance... *lower* maintenance costs with Fairbanks-Morse... to show you important design and manufacturing differences.

Note the sturdy construction and exceptional strength provided by the arched casing and solid pump base... the ease with which the entire pump can be inspected or the entire rotating element removed without disturbing driver or pipe connections. Exceptionally smooth water passages reduce friction and "back eddies" to the minimum. Bearing brack-

ets, cast integrally with pump body, maintain accurate, permanent alignment of shaft and impeller. Smooth, one-piece impeller reduces wear and maintains efficiency. Impeller is pressed on shaft over a key so that the key also drives the shaft sleeves and prevents destructive rotation of the sleeve on the shaft. Removable casing and impeller wearing rings assure easy maintenance and have streamlined water guiding surfaces for maximum pump efficiency.

These are but a few of the many performance-making features you'll find in Fairbanks-Morse Centrifugals. Your Fairbanks-Morse Pump expert will be happy to give you the complete story on these efficient, economical pumps. See him or write Fairbanks, Morse & Co., Chicago 5, Illinois.



FAIRBANKS-MORSE,

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PUMPS • SCALES • ELECTRIC MOTORS
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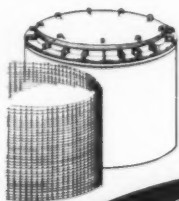
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Nichols Engineering & Research Corporation
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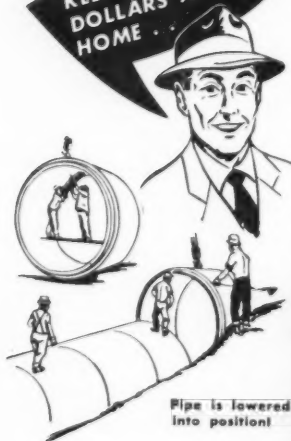
Pacific Coast office
40 So. Los Robles Avenue, Pasadena 1, Calif.

For more details circle No. 313 on Readers' Service card



Reinforced
concrete
pipe is
manufactured
on the job!

KEEP YOUR SEWER
DOLLARS AT
HOME . . .



Pipe is lowered
into position!

Save Taxpayers Money On Major Sewer Projects With A Universal Mobile Pipe Plant!

Here's how it works! The same equipment used to make concrete pipe in Universal plants is moved to your sewer pipe project and operated by competent Universal plant personnel. This insures production of the same high-quality product manufactured in any Universal plant.

Immediately, you've eliminated much of the shipping and handling costs. Local labor and materials further reduce cost of laying the sewer line. When compared with monolithic construction, as much as one third may be saved on a single project.

For more detailed information, contact the Universal plant nearest you or write direct to the home office.

Complete range of sizes up to 120 inches inside diameter, plain or reinforced. And don't forget to ask about Universal rubber seal gaskets to speed up laying any sewer line.

★ UNIVERSAL PLANTS:

Decatur and Dalton, Ala.; Tampa, Fla.; Atlanta, Ga.; Kenvil, N. J.; Binghamton, Port Washington, Rochester and Syracuse, N. Y.; Columbus and Zanesville, Ohio; Norristown and Pittsburgh, Pa.; Nashville, Tenn.; Clarksville, New Martinsville and Wheeling, W. Va.

★ UNIVERSAL Concrete Pipe Co.

Home Office: Room 501, 297 S. High St.

Columbus 15, Ohio

For more details circle No. 312 on Readers' Service card

MOTOROLA SERVES

**Free
Technical
Consulting
Service**

--- with thousands of Motorola 2-way radio systems now in operation to provide the backbone of any Civil Defense Plan.

Years ahead in every phase of development of 2-way mobile radio communication for Public Safety Services, Transportation, and Industry—MOTOROLA HAS ALREADY SUPPLIED THE NATION WITH 'CIVIL DEFENSE' COMMUNICATIONS of a highly superior quality.

MORE MOTOROLA SYSTEMS ARE IN USE TODAY IN POLICE, FIRE, AMBULANCE, TAXICABS, TRAINS, AND FACTORIES THAN ALL OTHER SYSTEMS COMBINED • A READY NUCLEUS FOR FAST EMERGENCY OPERATION.

In addition, Motorola has over a hundred thoroughly trained experts, each with years of experience—top engineers in this field ready to help you and your committee to whip your CD communication system into shape...Ready with **FREE TECHNICAL CONSULTING SERVICE** and the **PRACTICAL** knowledge for helping you put your plans into immediate action.

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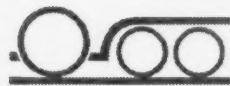
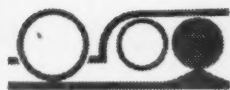
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The answer to this question is a matter of record. By actual test, it is the highest degree of road surface smoothness ever attained with tandem roller. A leading state highway department proved that the Buffalo-Springfield 3-axle tandem produces surfaces 50% smoother than the average obtained with conventional tandems of equal capacity. Also noteworthy, the same test showed that the 3-axle tandem averaged 60% more tonnage compacted than other units on the project. As a result, the specifications for asphaltic surfaces in this state now permit the use of one less tandem roller with each spreader, *provided* a 3-axle tandem is one of the rollers employed.

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There's a reason for this greater work capacity and smoother rolling results. The two large diameter guide rolls and the drive roll of the 3-axle tandem are rigidly mounted in a position tangent to the same plane. Thus, when one guide roll strikes a high spot in the pavement, the other is lifted clear of the surface and its weight transferred to the rolls retaining surface contact. Result—maximum compactive effort where it is needed most—on the high spots in the surface.

You can learn more about this transfer-of-weight principle and the many other exclusive features of the Buffalo-Springfield Model KX-25, 12 to 19 ton, 3-axle tandem from your nearest distributor. Why not call him today?



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Many devices that give us wonderful service today have passed through a period when their original simple designs became over-complicated, then by a process of refinement and simplification the best operating construction has been achieved.

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WARNING!

for AIR RAID, FIRE, SABOTAGE, DISASTER!

Federal sirens have been, and are now, the majority choice for air raid, fire and other warning purposes. During World War II, international committees visited American cities to study their air raid warning systems. It was not coincidence that those cities well equipped with Federal sirens were cited by these unbiased committees as having the finest and most comprehensive systems.

Experienced signal engineers know that the loudest signal is not the best signal for air raid warning. Volume is of little value without distribution. The more built up, the more congested an area, the less distribution of sound from any one unit regardless of its output. Every building, every tree, or every variation of topography, reflects, absorbs, or deflects sound. To offset these factors, as well as humidity, wind direction, local noise levels, etc., the sources of sound must be multiplied in number rather than increased in intensity.

Do not be misled. There are no "miracles"; no "wonder signals" to produce prodigious range at low cost. The laws of physics do not change. Despite claims that may be made to the contrary, no one inspired by World War III fears, has been able to completely outclass what Federal's years of engineering in audible signals is now offering.

Dollar for dollar, smaller signals will do a better, more uniform, more comprehensive and more dependable job than fewer large signals. In highly congested business districts, we recommend type D or type L sirens at street intersections. Less congested municipal areas can be covered well by 2 horse-power sirens located $\frac{1}{2}$ to 1 mile apart. Suburban residential or semi-rural areas usually can be covered by larger sirens at greater intervals.

Federal General Alarm Sirens are the product of years of experiment and experience. The vertical design was selected because of its numerous and obvious advantages.

Vertical rotating parts, like a spinning top, provide natural balance with minimum friction and bearing wear. The motor, rotating but one properly designed rotor, can convert a greater portion of its energy into producing sound.

Since sound is produced at the ports of the rotor and stator, a vertical siren radiates its voice horizontally over 360° where it is most effective.

Federal Vertical Sirens are available in a variety of capacities from 2 to $7\frac{1}{2}$ horse-power. Electrical services available vary widely, but sirens for generally available power supplies are carried in stock for prompt shipment.

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CONTROLLED FIRING . . . is a factor behind the *uniformity* of Vitrified Clay Pipe—whether it's one length, or a million. Electronic instruments correctly balance Clay Pipe firing time and temperature. This modern technology, harnessed to govern manufacturing processes, *improves* Clay Pipe's basic quality. Clay is chemically inert, completely unaffected by corrosion or the chemical wastes of modern industry. It's the *best* pipe for your sewerage or drainage projects.


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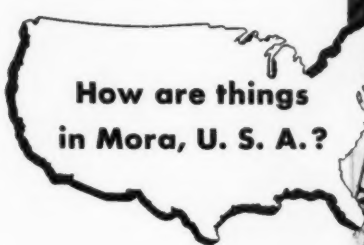
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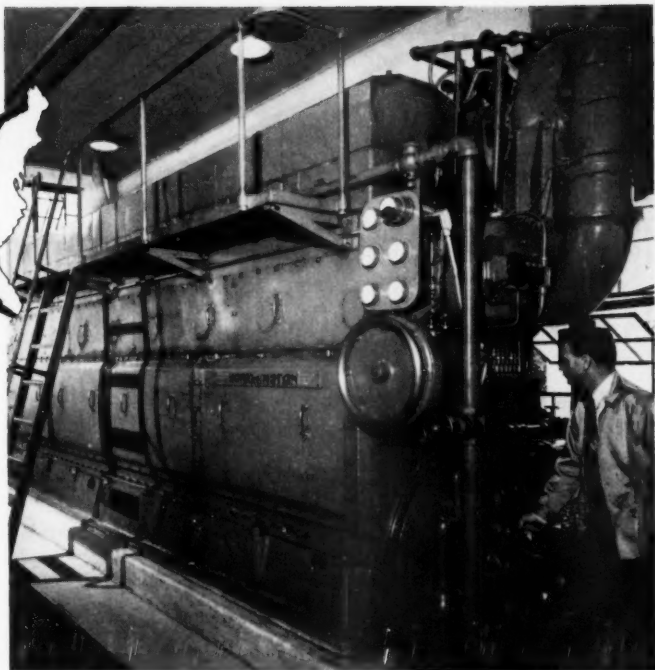
Additional information and data on Vitrified Clay Pipe, Wall Coping and Clay Flue Lining sent **FREE** on request. State your specific questions. Simply contact the regional office nearest you.

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How are things
in Mora, U. S. A.?

Rates Cut, Profits UP!



Things are as good in Mora, Minnesota as the song says they are in Glocca Mora.

Worthington Diesel engines operated by the municipal power plant in this progressive community have helped produce the lowest electric rate of any full Diesel municipal power plant in the state.

A Worthington 4-cycle supercharged engine, operating at low load factor of 42.6%, produced in 1950 5% more power per gallon of fuel than a 2-cycle engine operating at 59.4% load factor. Following the installation of the Worthington engine, rates were cut in 1949, yet net profits, in 1950, were greater than ever.

Worthington four-cycle supercharged

engine is particularly well suited to the needs of a growing community like Mora—whose peak kw load has increased an average of 11% a year in recent years. Even when over-powered, a plant can operate at very low fuel cost and have the added engine capacity when needed without additional investment.

When you buy a Worthington 4-cycle supercharged engine, you benefit, too, from the longest experience of any manufacturer with this type of engine. For any engine application, call on Worthington—an engine for any fuel: oil (crude or regular), gas or "dual fuel". Worthington's complete line of engines assures you of the

most economical operation no matter what fuel you use.

If gas or any combination of gas and oil offer fuel economies, consider Worthington gas or dual fuel engines. Only Worthington offers such exclusives as dual plunger pumps, gas micro-metering valves for each cylinder and thermal air controls—all built to give optimum performance for the fuel used.

For further details of the dependable, economical Diesel performance that proves there's more worth in Worthington, contact Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.

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**ECONOMICAL
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Diesel Engines, 150 to 2640 hp
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Cooling Water
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Water Coolers

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In Florida...

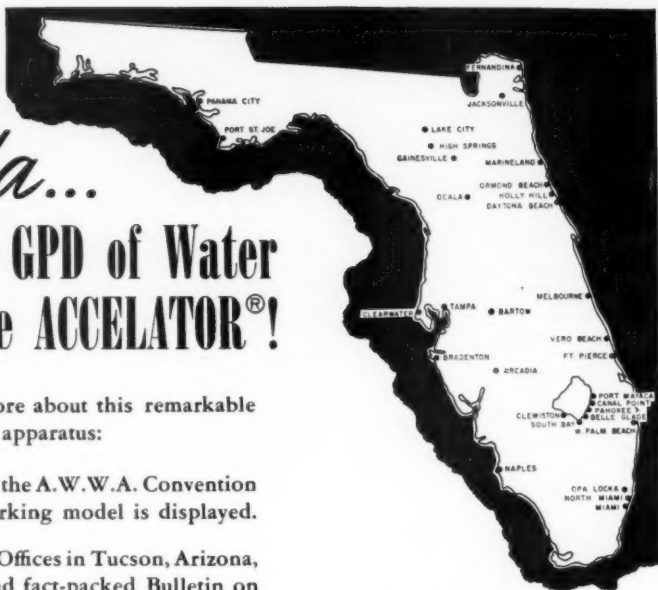
Over 100,000,000 GPD of Water Is Treated By The ACCELATOR®!

Here's how you can learn more about this remarkable high-rate water conditioning apparatus:

- Visit the Infilco Booth at the A.W.W.A. Convention where a transparent working model is displayed.
- Write Infilco's Executive Offices in Tucson, Arizona, for a 28-page picture and fact-packed Bulletin on the Accelerator.

SERVING THE WATER TREATMENT REQUIREMENTS OF INDUSTRIES
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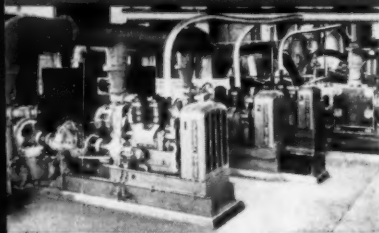
WITH OFFICES IN PRINCIPAL CITIES



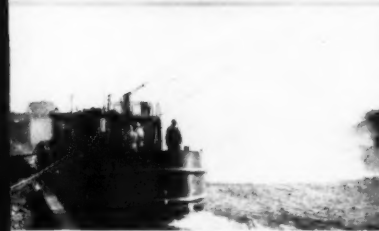
WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT

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READY TO SERVE IN CIVIL DEFENSE



Water Department of Pontiac, Michigan, has for standby service three 6-cylinder GM Diesel engines connected to pumps with a total capacity of 378,000 gallons per hour.



Chicago, Philadelphia, Houston and other cities depend on GM Diesel-powered fireboats for waterfront and harbor protection. These boats, with 6- to 12-thousand GPM capacity, are equipped to pump into city mains in emergency.



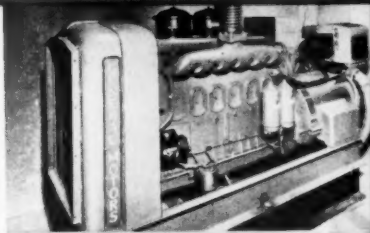
Portable Generating Sets up to 200 KW capacity, powered by compact GM Diesel engines, can be mounted in trailers. Mobile units like this can serve emergency requirements of small communities.

To ASSURE standby power for water supply, lighting and communication in emergencies, many of America's cities, public utilities, defense industries, hospitals, airports and radio stations rely on General Motors 2-cycle Diesel power. Pictured here are a few of the ways these high-powered portable Diesels help safeguard vital public services.

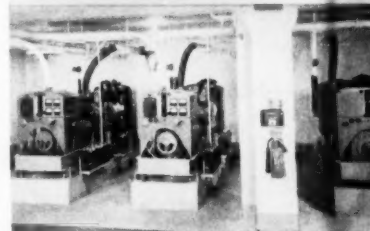


General Motors Diesel engines are built in a wide range of models to meet all types of power needs—Series 71 engines, 2 to 24 cylinders, 32 to 800 H.P. and 6-cylinder 110 engine, 275 H.P. For specific information on how these compact, portable Diesels can fit into your Civil Defense plans, write, wire or phone.

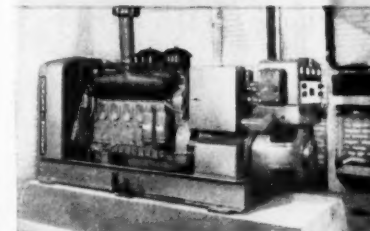
*Diesel Brawn
without the Bulk*



Radio Station WMPS, Memphis, Tennessee, installed this 60 KW GM Series 71 Diesel generating set for emergency standby use. This auxiliary picks up full broadcast load within 3 seconds if power supply drops below a critical point.



Telegraph Office has GM Diesel standby electric generators for emergency service. Similar sets of from 20 to 200 KW can take up normal voltage load of hospitals, defense plants, public buildings and small communities.



Over 800 U. S. Telephone Exchanges are equipped with GM Diesel Electric generator sets, providing a reliable source of emergency power to insure communications.

DETROIT DIESEL ENGINE DIVISION

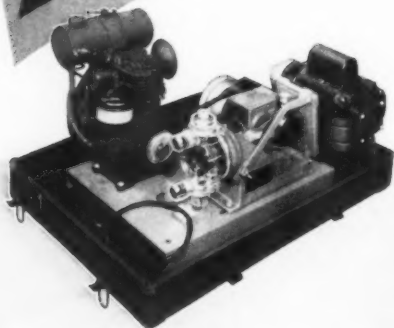
SINGLE ENGINES ... Up to 275 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS ... Up to 800 H.P.

GENERAL MOTORS



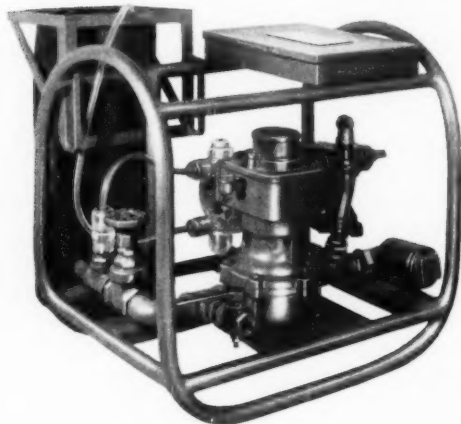
EMERGENCY

WATER TREATMENT for CIVILIAN DEFENSE



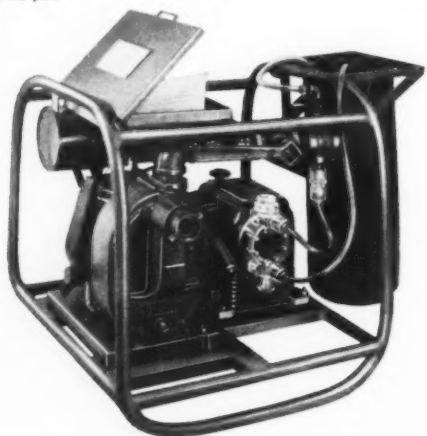
Dual drive (electric and gasoline) Chlor-O-Feeder

— an ideal standby unit for emergency chlorination service or main sterilization. A constant rate feeder for applying hypochlorite solutions at rates up to 5.5 GPM, pressures to 85 psi.



Hydraulically-operated Chem-O-Feeder

— for constant rate or flow-proportional feeding of hypochlorite solutions to establish and maintain any desired chlorine residual in a portion of a system or a pipeline in use.



Portable Pumping and Sterilizing Unit

— capable of pumping and hypochlorinating up to 50 GPM of water from any source.



Pur-O-Pumper

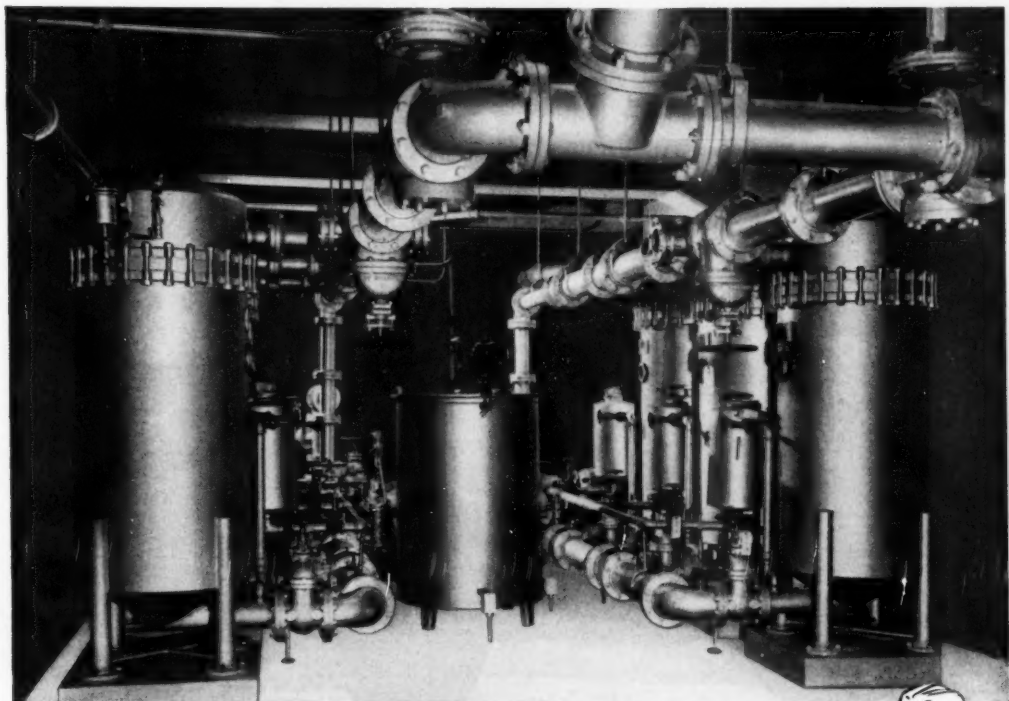
— similar to units used by the armed forces. Delivers up to 50 GPM of filtered and chlorinated water. Units of larger capacity available. Light in weight, easily mobile, highly efficient. The Diatomite Pur-O-Pumper removes amoebic dysentery cysts, turbidity, algae, and a large percentage of bacteria.



Make %Proportioneers% your source for emergency sterilization and filtration equipment. Profit by our experience gained in over 33,000 chemical feeding and water purification installations. Write for data and recommendations. %Proportioneers, Inc.%, 356 Harris Ave., Providence 1, R. I.

% PROPORTIONEERS, INC. %

PUR-O-CEL DIATOMITE FILTER PLANT



The plant shown is made up of two Batteries of three filters each. For normal municipal filtration the plant capacity is 1 MGD. For emergency treatment it can be efficiently operated at 3 MGD. Equipment of this type can be mounted on a trailer truck or flat car for emergency use, and will supply safe, potable water from rivers, ponds or lakes. Write for data and recommendations.

**WE'RE GOING
TRAVELLING**



%Proportioneers% trailer is making a tour of the country with an exhibit of emergency civilian defense water purification equipment in operation. Demonstration can be arranged for Civilian Defense Authorities and Water Works Association meetings.

% PROPORTIONEERS, INC. %

356 Harris Avenue,
Providence, R. I.

For more details circle No. 184 on Readers' Service card

Our Fire Front Needs Strong Weapons, Too!



America's firemen have once again stepped to the fore — not only as guardians against possible bombing conflagrations, but also against the increased fire hazards which accompany the full pressure industrial activity necessary to re-equip our Armed Forces.

But our firefighters, too, must have modern weapons. Good planning demands that they have them now — in the form of apparatus and equipment that will not fail them in any battle they may face.

For its part, Mack pledges to the fire service its continued devotion to the highest standards of apparatus design, manufacture and maintenance. "Built by Mack" will continue to mean *performance that tops them all.*

Be Performance-Wise—

Modernize with



MACK MANUFACTURING CORPORATION

Fire Apparatus Division, Long Island City 1, New York

Factory branches and distributors for service and parts in all principal cities. In Canada: Mack Trucks of Canada, Ltd.

TRIPLE COMBINATION PUMPS — 500 TO 1500 GPM... SQUAD AND HOSE CARS... AERIAL, CITY SERVICE AND QUADRUPLE COMBINATION LADDER TRUCKS

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The CONCEPT of

CIVIL DEFENSE

CIVIL defense is based on the principle of self-protection. But there is little that the individual, by himself and working alone, can do. Strength can come only from organized cooperation with others. Community action is necessary; and in such community participation, organization, cooperation and coordination of effort are implicit. Without these essentials, the principal problem remaining is where to hide.

Civil defense begins at the local community level. Its primary purposes are, first, the protection or defense of that community; and, second, the ability to render aid to other communities. The higher echelons of government—the state and the nation—can give guidance in organization, help to coordinate mutual aid programs among communities, and aid in emergencies. The impetus for organization, the skills and the work must come from local sources.

Planning and organizing for civil defense is thus a problem which each community must handle for itself, utilizing primarily the re-

sources of local skills and equipment it possesses. General outlines for civil defense organizations have been prepared as guides for local action; but, since every community differs in some respects from all other communities—there is no Middletown, U. S. A.—specialized study is necessary in order to utilize most efficiently local resources to meet probable local needs. Such study will indicate the problems, and also the resources that are available locally. Properly carried out, a comprehensive study may develop newer and better ways of meeting day-by-day municipal problems. Civil defense may thus produce immediate returns in better government, as well as future returns through preparedness for disaster.

The engineer should be a leader in civil defense. In no other profession is there an equal opportunity to develop the ability to manage complicated construction problems; to organize work and direct the efforts of many workers; to judge the work that machines can do and to learn how to use them most ef-

fectively; and to accept responsibility with equanimity. These factors may well be summed up in the military term "ability to command." In addition, the engineer has an intimate knowledge of such vital utilities as highways and streets, water supply and sewerage, all essential elements in the daily life of the community, whether in peace or in war.

The Scope of Civil Defense Programs

Civil defense organization can do far more than provide passive defense against possible enemy action.

PUBLIC WORKS Magazine

VOL. 82
APRIL

NO. 4
1951

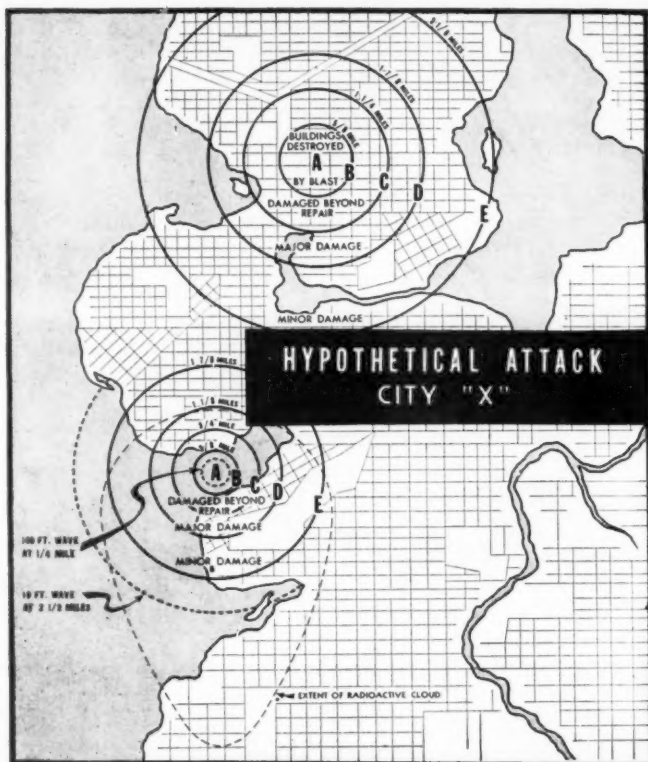
It can plan to mitigate natural disasters and can defend against many kinds of bacteriological warfare. Natural disasters may arise from floods, hurricanes, earthquakes, fires and explosions. Records show that major natural disasters occur somewhere in this country on nearly a one-a-year average; and almost universally no preparation has been made to meet any of them.

Biological warfare, aimed at spreading disease among the civil population can be largely nullified by intelligent civil defense planning and organization, plus good municipal operating and housekeeping procedures. Also, civil defense can strengthen and improve normal municipal operating procedures affecting the health and prosperity of the citizens. Finally, if necessary, it can provide the essential national resistance to the attack of any enemy by any means.

The Problems of Large and Small Cities

There are reported to be some 140 areas in the United States which are potential targets for enemy attack by virtue of size or industrial or political importance. This means that the great bulk of our communities will be subject to attack only by sheerest chance or accident.

Plans for civil defense for the areas of undesirable pre-eminence should be based primarily upon



● ABOVE, plan for a hypothetical attack, as suggested by U. S. Civil Defense Handbook.

helping themselves in case of an attack, receiving such aid as may be furnished by neighboring communities, the state and the Federal Government. Plans for those areas unlikely to be subject to attack should be based primarily on aiding neighboring communities and coping with natural disasters. For these purposes, well-trained, small, mobile units, self-contained or largely so, have many advantages.

Making the Organization for Civil Defense

In any city the mayor is responsible for the welfare of that city and, as such, is charged with the primary responsibility for civil defense. He may, and usually should, delegate the actual work to someone else, selecting a Director of Civil Defense from among those in the community who have experience and training in planning, organizing and directing large-scale operations, and in the management of govern-



Courtesy Mack Trucks

● MOBILE disaster unit equipped by industry, one of several trucks, showing first aid equipment and supplies carried.

mental affairs. To advise the director, there should be an advisory committee representing the important elements of the community—construction, labor, the medical profession, real estate, food supplies and others of like nature. If possible, the advisory committee should not be large—it is usually advantageous to hold such a committee to a maximum of 6 or 8. Other interests can be utilized by means of subcommittees, drawn from outside the principal committee, and assigned special projects for study and recommendation.

It must be understood clearly that the Advisory Committee is intended to advise and not to direct. There can be but one boss in any well-run organization. Government by committee has never worked and never will.

With the advice of the Mayor and the Advisory Committee, assistant directors should be appointed. Upon the ability of these men (or women) depends the success of the project. Selections should be made with care; even then it is too much to expect that all of the initial selections will measure up to the desired standard. Tentative appointments, with confirmation or replacement after enough work has been done to indicate the wisdom of the selections is desirable though it may be difficult.

The number of divisions and of assistant directors should be limited. A number of the organizational charts for civil defense that have come to PUBLIC WORKS have shown as many as seven to ten assistant directors. This is too many. Few men can direct properly the work of more than four or five others. Perhaps the best organization that we have seen is, in our opinion, that developed by Toledo, Ohio, more data on which will be given later. This provides for a Director, Deputy Director, four operating divisions and one staff division. The operating divisions are Public Safety, Public Works, Medical Service and Welfare Services. The staff division or special staff includes sections for Communications, Transportation, Evacuation and Mutual Aid and Mobile Assistance. The Toledo organizational chart is shown on another page; some others are shown herewith. It is believed that the separation into operating and special staff is sound and advantageous.

Getting the Job Started

The first job is to study what may happen. Above all, is a bomb likely

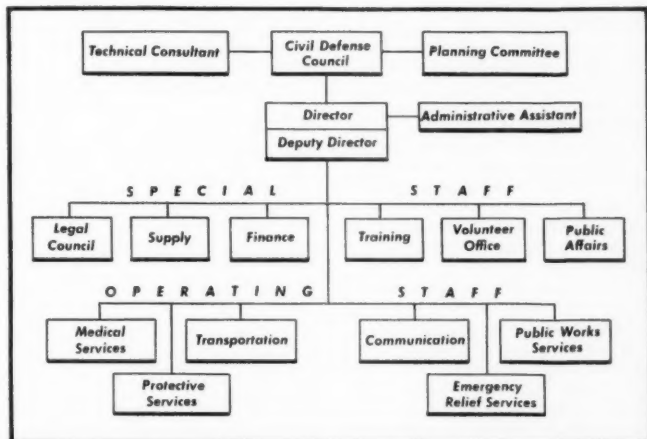
to fall? If not, the primary job is to help others and to prepare for any natural disaster that may occur. If so, assume, for instance, that one bomb or two, or even more, may fall. The area or areas affected can be delineated on a map and the results estimated in terms of persons killed or injured; of the number of people homeless; or houses destroyed; of streets, bridges and other means of transportation made unusable; of water supply damaged or lacking; of waste disposal facilities destroyed; of light and power lacking; and of how much, if any, evacuation may be necessary.

As a single phase of an example, a bomb falling on an area having a population of 50,000 people per sq. mile would create a seriously damaged area (aside from the area of total destruction) of somewhat over 4 sq. miles and would affect a popu-

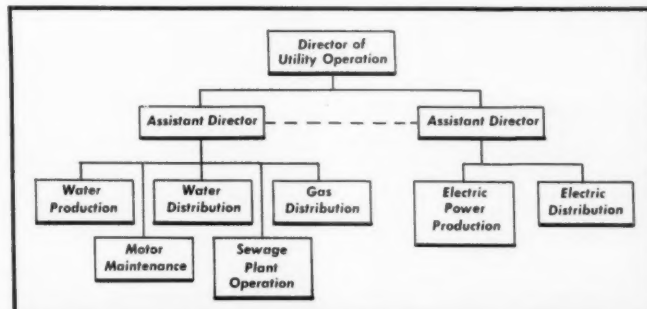
lation of about 200,000. If it were deemed necessary to serve this area with water hauled in, computations might take the following form, suitable local assumptions being made:

If it were assumed that a generous 3 gallons of water must be furnished every person every day, it would be necessary to procure, treat, haul in and distribute about 600,000 gallons per day. Using tank trucks having a capacity of 1,000 gallons, and assuming that a round trip could be made from water source to water point, including loading and unloading, in 30 minutes, 25 such trucks would be required on the basis of a 12-hour working day. On the basis of a 20-hour day, fewer tank trucks would be needed; but the provision of additional necessary storage at the water points might be a problem. It is doubtful if con-

(Continued on page 84)



● TABLE OF Organization for Civil Defense, Shorewood, Wisc., showing staff and operating divisions and chain of command.



● TABLE OF ORGANIZATION for Utilities Department, Civilian Defense and Disaster Corps, Palo Alto, Calif.

ENGINEERING PLANNING FOR DISASTER

BY "engineering" is meant that division charged with responsibility for engineering planning and performance. It may be termed "public works" as in the Toledo and many other plans; or "engineering services" as in the Civil Defense booklet, or it may be given some other name. Irrespective of its name, it will have many weighty and difficult responsibilities.

Because engineering deals so importantly with the physical aspects of planning for, and doing, the work incident to disaster relief, and these aspects are the ones which permit or facilitate relief, medical and welfare agencies to operate, thorough planning is necessary. In this section will be outlined briefly some of the more important engineering duties in planning. Certain of these are covered more fully in special sections of this issue, but are included briefly here in order to provide a more complete picture.

As a background to its planning, engineering should participate in, and be completely familiar with the data obtained from, comprehensive surveys of existing civil defense, welfare and disaster relief facilities. Unless it does this, engineering cannot plan its program properly.

In actual planning, engineering should study the problems it may have to meet; survey the resources available to meet them; determine the sufficiency of the resources at hand and the additional resources needed; develop local resources of skilled personnel; and make sound and workable engineering plans for organization, direction and performance of the needed work.

Streets and Highways

The street and highway network should be surveyed for routes and alternate routes into and out of the community, and to neighboring communities. Possible disasters should be considered and in the light of these, definite routes and alternates to them should be selected for each condition of disaster. Equally definite plans should then be made to assure that the selected routes are cleared and made as fully usable as possible in

the shortest time. In furtherance of this, motor graders, bulldozers, tractors, and other equipment should be studied and assigned to suitable tasks. Where bridges may be damaged or destroyed, plans should be made for alternate routes or for a pontoon bridge or ferry, necessary equipment and materials being designated for the work. This may include bulldozers, motor graders and shovels for preparing approaches; iron grating, aggregates, planking or wire mesh for approach surfacing; and pile drivers for setting supports for piers or docks. Consideration must be given to dispersion of equipment and materials, so that, for instance, a disaster affecting an important bridge would not also affect the needed repair equipment and materials.

Housing and Public Utilities

If the community is planning to utilize buildings or other structures for large-scale housing, or for shelters; or if it is planning to construct shelters, engineering advice is essential on a number of important matters. These include the structural safety and resistance of the buildings or shelters; the floor space and air space that should be provided for each person; ventilation; and the provisions of water supply and

of toilet facilities, on which more information is given later.

Since, water, light and power are essential for community life, the likelihood of interruption of these facilities should be investigated and provision made, if necessary, for alternates or substitutes. That is, standby power in the form of diesel or gasoline engines may be provided to assure uninterrupted delivery of water; and, in addition, provision should be made for procurement, treatment and delivery of water by retail methods. Power supply is more of an electrical engineering problem, but the public works engineer should know the weaknesses, the susceptibility to damage and the probable time required for repairs or he cannot plan his work efficiently. The problem of sewage disposal, if power is cut off, may be an urgent one; and consideration should be given to standby pumping facilities where local conditions are such that sewage overflows, due to lack of pumping, would create a health hazard.

Personnel Resources

Trying to do the work with entirely unskilled personnel will be hopeless; and it is about as hopeless to try to train people who have no background in construction or



Combine Photos

● WHAT a bomb can do to street car tracks and pavements. This view shows World War II happenings in North London, England.



Combine Photos

● **MAJOR street clearing problem in London, after World War II bombing, required much equipment.**

equipment use to do the work. Therefore, the resources of the community, and even of neighboring communities, should be combed for personnel, both specialists and technicians. It is best to develop a rather comprehensive form for recording experiences and skills. With such information as a background, a wiser and more effective selection of men for the specific jobs is possible. In seeking and selecting personnel of the type needed, local contractors can be a very valuable asset. The "know-how" acquired in construction work is needed in meeting disasters.

Equipment Resources

Just as with personnel, the resources of the community, and of neighboring communities, should be surveyed for valuable construction equipment—trucks, tractors, bulldozers, motor graders, front end loaders, power shovels, pumps, air compressors, etc. With proper analysis of the tasks that may have to be done, it is possible to develop teams to do these tasks—just as the city already has street repair gangs or teams and the county has road construction or bridge building crews. From these, the equipment and personnel needed to do the work can be determined. In general, these task units should be self-contained; they should be given considerable freedom of local action in carrying out their assignments; and units and equipment should be dispersed for protection against loss. That is, not all tractor-bulldozer units should be stored in one place, nor should all tractor-bulldozer operat-

ing teams live in one section of the city. Rather, one crew should come from the eastern portion of the community, another from the western, etc.

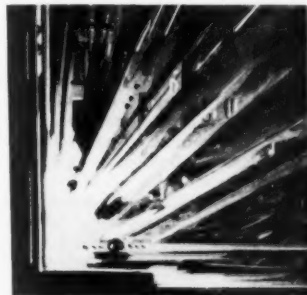
Training and Practice

Because some of the jobs to be done in disaster relief are not comparable to work that is done in normal times, some training may be needed; and some "dry runs" may be essential in the process of getting ready for trouble. It may not be possible to duplicate for practice all of the problems that are likely to arise if disaster strikes, but some of them can be duplicated closely enough to be of real value. A few may be suggested, as building a pontoon or ferry approach; cutting a path through a to-be-demolished building; or setting up a water point. Designation of two or three of the younger men to think up practical problems that can be tried out locally to test the organization may be advantageous. Map problems, somewhat after the military manner, may be used to develop ideas among foremen and supervisor groups.

There are many engineering records which are essential to the community. No one knows as well as the engineer which these are. Duplicates should be made of these, by any of the various methods that are available locally, as by micro-film, and these duplicates should be stored in various places. Perhaps one or two copies may be sent to neighboring communities.

Local equipment should be carefully surveyed with two things uppermost in mind: (1) keeping pres-

ent equipment in first-class condition; and (2) adding such special equipment as may be used advantageously in every-day work but which will be of exceeding value in case of an emergency. A third item might be added—replacement of worn-out equipment with pieces that will stand up under emergency use. Equipment that may be considered as necessary, unless an adequate supply is already on hand (which is rarely the case) may include: Self-contained generator sets for furnishing lights for night work or for emergency service. A headquarters cannot function in the dark and, in case of disaster, work does not cease with dusk. Pumping equipment; tractor loaders; bulldozer attachments for all equipment able to receive them; drills; tampers; crawler tractors; and motor graders are all-around useful equipment that any community can use to advantage. For communications, a few 2-way radio sets will greatly speed up the work and permit effective control from headquarters.



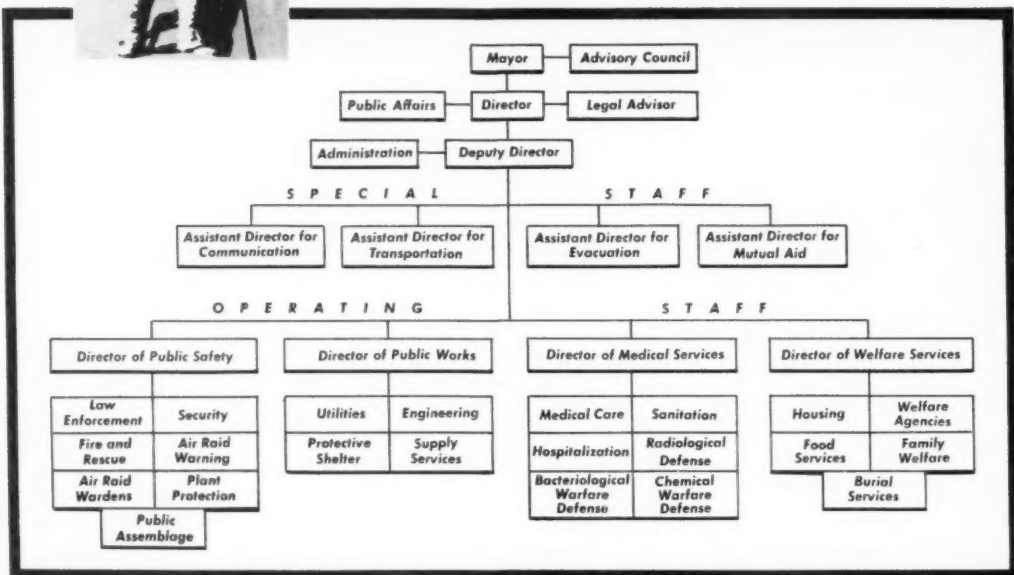
THE TOLEDO PLAN



A Lt. Col. in the Army Reserve, Mr. Mora is Advertising Manager of The Toledo Edison Co., though devoting full time to Civil Defense. The Toledo plan, in which he had such an important part, is one of the best we have seen. Consequently, we asked him to explain it to our readers. We believe everyone will profit from this article.

includes seven years of service in World War II, with a course of training in the G-3, or plans and operations, section of the Command and General Staff School, the highest service school of the army. I

El Kebir, near Oran, I saw barefooted women and children climb over barbed wire fences which inclosed the port to seek shelter under a number of huge concrete blocks which had been made,



● **ORGANIZATION** for Civil Defense, Toledo, O., described herewith, showing the special and operating staffs and the scope of duties assigned to each element of the organization.

JOSEPH F. MORE

Director of Civil Defense, City of Toledo, Ohio.

PRACTICABILITY, simplicity, specific assignment of tasks and responsibilities and the fullest possible use of existing facilities, have been the guiding principles in the development of the Toledo Plan of civil defense.

In the drafting of the basic plans I had the assistance of Rear Admiral Robert W. Cary, a retired naval officer with a distinguished record in World War II. My background

spent thirty-four months overseas, serving mostly in the capacities of a general staff officer and provost marshal. I observed rather closely the calm, almost systematic operation of civil defense in England, where it undoubtedly saved many lives.

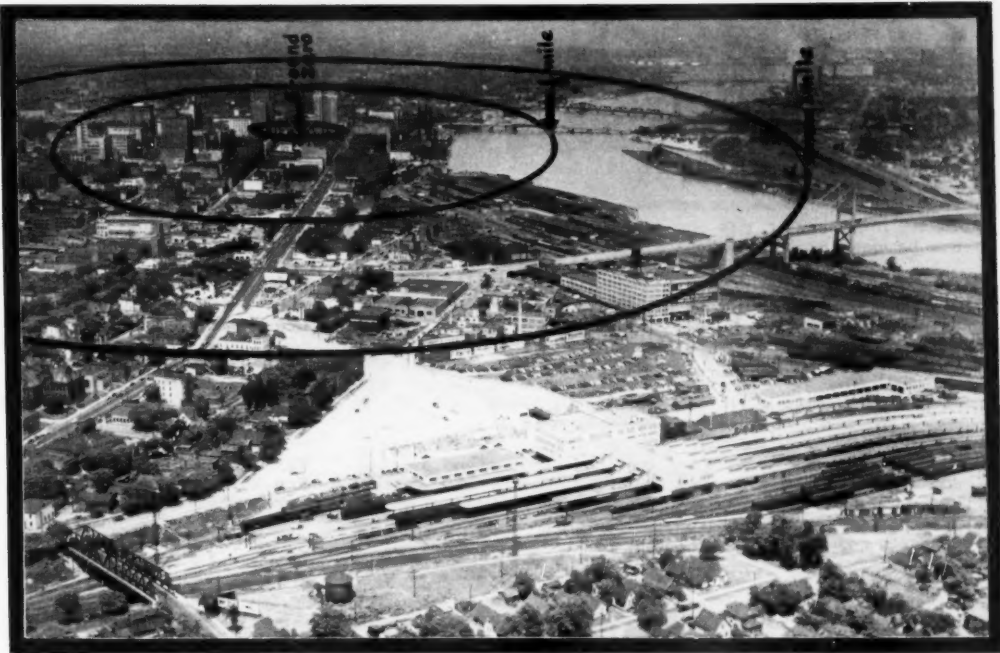
African and Italian Data

In Africa there was an utter lack of control, and there was a near-panic among the natives every time an enemy plane approached the area. Arab women even forgot their veils and ran for shelter, dragging their children with them. At Mers

though never used, for the extension of the docks. A large scale raid would have caused a tragic and useless slaughter of a great number of people.

I arrived in Naples on Christmas Day, 1943, shortly after our troops passed the city, and I assisted in clearing and cleaning up the down town area. Many streets were clogged with rubble, and garbage had not been collected for some thirty days. The Italians had no meat to throw away, and dogs efficiently cleansed all bones of flesh and fat. Nevertheless, in many narrow streets the odor was almost

FOR CIVIL DEFENSE



unbearable. The water system was damaged. We hauled water into the affected areas; and I saw people line up for many blocks to get a gallon or a bucket of water. In Italy there was no civil defense organization, aside from shelters. Strangely enough, the people were both afraid of, and apathetic to, the dangers of bombings. Some of them ran for shelter every time the siren sounded, but many remained in their homes. In one instance 41 persons were killed in a small apartment building. All of them would have lived had they gone to a shelter.

Admiral Cary and I studied all available sources of information on civil defense plans for cities and the problems that would confront us in case of atomic bombing. At the same time we considered fully the structure of our city government. We decided, also, that good planning is both simple and definite, allowing no misinterpretation. So the organization structure is streamlined, and without elaborate headquarters staff.

At the top is the mayor, A. C. Czelusta, with the advisory council.

● **WHAT could happen in Toledo, or any other major city. The Toledo plan is designed to deal with the problems of disaster.**

This is a fortunate circumstance. Toledo is operating under the manager plan, and we consider Arnold V. Finch tops among city managers. In case of an atomic attack on the city, however, he would be so busy with the multiplications of his regular duties and responsibilities that he could not give full time to disaster relief. In our mayor we have a highly capable executive who could give all his time and effort to problems of disaster.

The basic plan outlines not only the responsibilities but also the authority of the civil defense director. Back of it is a city ordinance which not only provides for the organization of civil defense but also authorizes the director to promulgate regulations with the advice of the advisory council. These, when filed with the clerk of council and not repealed by the city council within 30 days, have the same effect as law.

In the organization structure, the Public Affairs section is essentially an educational program, through the media of publicity and speakers.

The legal advisor is the city law director. The administrative section needs no explanation.

We placed communication, transportation, evacuation and mutual aid and mobile assistance into a special staff section because each of these is involved in practically every operation. Each of these four sections has a tremendous task, not only in actual operations but of organizations and planning.

We assume, for example, that in case of atomic attack the regular channels of communication will be disrupted, so we are setting up alternate systems. We are integrating short wave operators into our communication, to be supplemented by motor, foot and aerial messengers. In our transportation section we will ultimately have record of every commercial vehicle, each of which





● **SOME** thirty cranes, city and privately owned, can be made available following a disaster.



● **BULLDOZERS** are most valuable in clearing streets and pushing aside and handling rubble.

will be assigned a definite mission and location. While we are establishing evacuation points, we do not plan mass evacuation before attack. In time of war we are likely to have yellow alerts daily, and we cannot disrupt our entire economic life every time an enemy plane crosses our border. After red alert there is no time for evacuation. We are arranging for mobile assistance with the surrounding communities; and we, ourselves, shall develop mobile units, particularly in the medical, auxiliary fire and police and rescue divisions, to go to the assistance of any stricken community within or without our area of operations.

In Case of Disaster

In case of large scale disaster, the big load would be carried by the operating staff. Here we have the sections on public safety, public welfare, medical services and public works, which parallels our municipal organization.

The director of the public safety section is Edward DeAngelo, the city safety director for many years. Able, energetic and aggressive, he is a passionate apostle of law enforcement and of efficiency in both the police and fire departments. Under him are the divisions on law enforcement, special security, fire and rescue, air raid warning, warden services, plant promotion and public buildings.

The Medical Services section is headed by Dr. Walter H. Hartung, our director of public health. He is not only a highly respected member of the medical profession but has many years of experience in the field of public health.

I consider the care of the wounded following enemy attack as the first responsibility of civil defense. Dr. Hartung is organizing the medical resources of Toledo. Ultimately every physician, dentist and nurse will be assigned to definite posts and units. Emergency hospitals will be established in schools outside the congested areas. Definite responsibilities will be assigned to sanitation personnel. Our radiological division is already being organized under Dr. Herbert A. Crandall, a former army officer who had special training in that field. We have made provisions for chemical and bacteriological warfare defense, but we are awaiting further advices from the Federal and State civil defense directors before we activate these two divisions.

The director of our welfare section is Arthur W. Gratop. In this we are fortunate, for Mr. Graton is not only Toledo's welfare director and an excellent organizer, but he is also welfare minded, which is a great asset to civil defense. In this department of civil defense we have the fullest possible support of the Red Cross. The entire organization of the local chapter on housing and food services is being integrated into Mr. Graton's section. The Red Cross is training additional people in food services and other activities so we can enlarge these two divisions to meet our requirements.

The division on family welfare was born of experience. In Italy I went through several air raids, and in the wake of destruction I repeatedly witnessed the utter despair of people and the helplessness of parents looking for their children and of children who had lost their

parents. Assistance in such cases, even a word of cheer or comfort, would have helped tremendously in restoring the morale of those people. The family welfare division is established to carry out those objectives.

In the welfare section is, also, the division on burial services. This could well be in the medical section. But we considered the tremendous responsibility of the collection, hospitalization and treatment of the wounded in case of atomic attack, and we wanted to relieve the medical director of the responsibility of caring also for the dead. Placing this division into the welfare section was a logical alternative.

Highway and Street Clearance

It is difficult for a layman to visualize the tremendous problems which an atomic explosion would throw into the lap of the director of the public works section. In case of an air burst, which we consider the most likely type of atomic attack, there would be utter destruction within a half-mile radius of point zero. In the one-half to one-mile radius most buildings would collapse. Streets would be piled high with concrete, bricks, steel and other materials. Damaged buildings left standing would constitute great danger to all people entering the area. Bridges in that one mile zone would be either destroyed or badly damaged. Utility services, including water, electricity and gas would be disrupted. And there would be fires, perhaps many of them. In many of the collapsed buildings there would be people alive but trapped.

There are two major civil defense functions which must start immediately after the explosion: rescue



and fire fighting. However, neither effective rescue operations nor fire fighting can be undertaken until the stricken area can be entered. The Public Safety director is drafting emergency traffic plans, based upon the principal target areas in the city, and the overall plan will be closely coordinated with those of the Ohio and Michigan state police. But within the city the routing of even emergency traffic must depend upon the operations of the public works section. We know that the closest possible coordination is not only necessary but imperative.

At the head of the Public Works Section is B. R. MacRitchie, the city service director. He is not only a highly capable engineer but also a man with a great deal of imagination and with an unusual capacity for systematic planning. He already has accomplished a great deal not only in planning but also in organization.

Within his section are divisions on utilities, supply services, protective shelter and engineering. The utility division is further subdivided into their components, electricity, water, fuel gas, sewage, telephone and public transportation. These services are so highly specialized that each must set up its own organization to deal with the emergencies of large scale disaster, provided that the civil defense body will provide assistance in both labor and equipment.

Under the protective shelter division, groups of architects and engineers already are examining buildings in the downtown areas to determine their suitability as shelters. The supply division is set up to serve both as a procuring and issuing agency on civil defense equipment and supplies.

It is the engineer division which is charged with the responsibility of making the operation of rescue, fire fighting, collection of the wounded and other civil defense functions in the stricken area possible.

There is no way we can protect our streets and bridges against atomic attack. It is doubtful that an air burst would do great damage to the streets themselves. But in a one-mile radius every traffic artery would probably be closed. The collapse of a 15-story building, for example, would create a barricade two stories high or more. In the outer

Civil Defense Toledo '51 Aim

Most Pressing Issue, Mayor Czelusta Says

The organization of a civil defense system is the most pressing problem facing the city this year, Mayor Czelusta said.

Defense Plans For Industry Are Started

Plans to assist Toledo firms and their employees in case of emergency.

Veterans Offer Assistance For Civil Defense

By Jim Tippet
PRESS News Editor

Council pledged Tuesday night in its 31st session to accept the fullest possible cooperation from the newly named civil defense council which will be organized within a few days.

BACKS CIVIL DEFENSE

School Defense Program Placed Under Committee

14-Member Educational Co-Ordinating Group Includes Public, County, Parochial Delegates

Organization of a civil defense program for the schools was placed today in the hands of an educational co-ordinating committee by Joseph F. More, Toledo defense director.

The 14-member committee, formed less than a week after Mr. More asserted the schools hold priority in Toledo's plans for defense against atomic attack, includes representatives from public, parochial and county schools.

It will meet weekly and serve as a clearing house for parties.

Schools' Civil Defense Plans Are Outlined

51,000 Children To Be Trained For Possible Bomb Attack

Raid Warnings, Sabotage Get Civil Defense Priority

Problems Stressed At Advisory Council

● **NEWSPAPER publicity is essential in public understanding and support. Here are some Toledo clippings.**

fringes of the damaged area there would be buildings standing, but in such condition that they would be structural hazards. Certainly, effective rescue operations and fire fighting could not be carried on until at least the main arteries are cleared. Here is MacRitchie's projected plan to deal with this problem.

We are registering all heavy equipment in the city, including cranes, bull dozers, drag lines, patrol graders and dump trucks, with operators and drivers. This will not be a static list of equipment. It will be checked periodically, at least once a month, so we will know their locations and availability at all times.

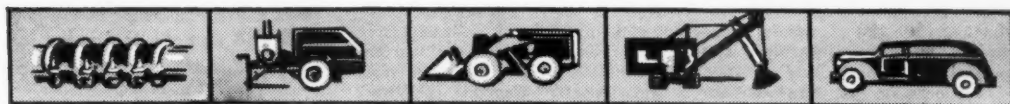
After an atomic attack, there would be a quick survey by air to determine the exact point of destruction. In the meantime all heavy equipment would be mobilized. Re-

ports by radio and by foot messengers would be coming to the control center. The traffic division would implement the traffic plan it had prepared for the stricken area, with necessary modifications.

The heavy equipment, assembled at designated control points, would be directed by radio to proceed by specified streets into the area. There bull dozers and cranes, patrol graders, drag lines and dump trucks would go into action, clearing first the main arteries and assisting in rescue operations.

Simultaneously, demolishing crews, working under the direction of qualified engineers, would demolish buildings which had been so badly damaged that they would be hazardous if were left standing. It is essential that these crews work under the direction of qualified engineers because it would be of great

(Continued on page 88)



Sanitary Engineering

GORDON E. McCALLUM,

Sanitary Engineer Director,
U. S. Public Health Service,
Health Emergency Planning.

TECHNOLOGICAL progress and increase in competence of local personnel have resulted, under normal conditions, in quite reliable man-made public-health safeguards. Under conditions of disaster, however, many public health safeguards will be destroyed suddenly. At the same time, key personnel may be injured or unable to perform their duties. Adversities of this nature, accompanied by failure of utility services, communications and transportation, will make protection of



● **INSECT control procedures may be required in areas such as the one shown above.**



● **EMERGENCY feeding stations will require close sanitary supervision to prevent disease.**



● **RADIOLOGICAL monitoring to determine if buildings are safe for use.**

the health of the uninjured population a major problem.

It is unfortunately wholly possible that the health of that large segment of the population not directly affected by the disaster could be overlooked or neglected. This may be partly because the less spectacular work of sanitary engineering is overshadowed by such glamorous and sensational activities as care of the injured, rescue, demolition and clearance. It must be remembered that the number of uninjured will generally be many times greater than the injured; and that it is this uninjured population group that must maintain industrial production, keep the community functioning, and eventually restore it to normal.

Consideration of the sanitary

engineering problems in disaster leads one to certain basic conclusions. With the possible exception of complicating factors induced by new weapons, such as the atom bomb, war gases or biological warfare, environmental sanitation problems in any future conflict will be similar to those which occurred in damaged areas during World War II. Evacuation; emergency shelter and feeding; protection of water, milk and food; insect and rodent control; and similar problems will become of paramount importance.

Special weapons of war have been discussed voluminously during the past few years. Though their possible effects should not be dismissed lightly, neither must they be permitted to become a block to a sensible plan of defense. The first step is to study and consider their characteristics. For instance, the atomic bomb, excepting for its radiation effects, is primarily a blast weapon. The public works engineer is interested in its effects on subsurface utilities. The fact that these do not generally sustain great damage from a high air burst will influence his planning. Likewise, the public works, as well as the health official, is interested in the fact that the fallout of radioactive substances from a high air burst in clear weather would not generally contaminate water supply reservoirs.

One of the most realistic statements concerning biological warfare is contained in the "Health Services and Special Weapons Defense"



● **BOMB damage in London in World War II illustrates the need for adequate planning to**

Problems in Disaster



● **EMERGENCY** shelter facilities had to be provided following a disastrous flood.



● **RESIDUAL** radioactivity may require careful monitoring of seriously exposed areas.



Combine Photos
meet need for repairs and reconstruction in disaster. Use of heavy equipment is essential.

handbook of the Federal Civil Defense Administration, which states: "Biological warfare against people should not be looked upon as some mysterious, uncontrollable means of wholesale destruction of life. Actually, nature has directed biological warfare against man for thousands of years, but health workers have devised and applied constantly improving preventive methods." This warfare of nature has long been a concern of public health officials, and the problem has been effectively handled. An extension of the existing health structure of the country will form the best defense against biological warfare. Defense against chemical warfare will be similar in many respects to defense against biological agents. The problems and the means for overcoming them are not dissimilar to those in which the public health profession is already skilled.

New Skills for An Old Problem

However, structural damage to such facilities as water works will present problems of a type and magnitude not ordinarily encountered, and this problem must, therefore, be considered carefully. In recent years, neither water supply nor sewage disposal has required nor received the degree of assistance and supervision formerly furnished by public health authorities. This has resulted from improved design, more dependable equipment and increased efficiency

in operation. But under disaster conditions, this normal situation is likely to be suddenly and completely reversed. Complex engineering problems of temporary construction and emergency operation of equipment and facilities must be anticipated. Extensive damage, with a consequent breakdown of normal safeguards, may pose sanitation problems reminiscent of a half century ago.

The activities which are normally carried out by a particular department are likely to be well planned and executed in times of disaster. Emergency undertakings, which are of infrequent occurrence, or have no peace-time counterpart, necessitate



● **WATER** distribution, using milk cans, may be a problem under emergency conditions.

the utmost attention in advance planning, organization and coordination of effort; and not infrequently may require special skills.

Emergency Water Supply

As an example of this, consider the matter of emergency water supply. It is possible that, although a number of municipal departments have considered their responsibility and role in transporting water to areas where water service may be interrupted, no specific provisions have been made by any authority to inventory and assemble water carrying vehicles, with drivers and all the necessary facilities, actually to do the job; nor to consider the previous uses of these vehicles and the treatment and modifications necessary to make them fit and able to carry water.

Admittedly, this is a type of operation which is most likely to be inadequately planned. The need for such large-scale emergency service is infrequent. As a result, it may not be a basic responsibility of any municipal department. Its planning illustrates well the basic factors in preparing for an emergency. It should be handled by the department best equipped to do it, usually by some component of public works; but, consistent with its usual functions, the health department should participate to the extent necessary to protect public health. This may involve such responsibilities as:

- (a) Determination of the source and quality of the water to be used.
- (b) Decision on type and degree of water treatment, if necessary.
- (c) Decision as to whether or not former use of tanks will render them incapable of being cleaned and disinfected.
- (d) Recommendations for and supervision of tank cleaning procedures.
- (e) Sampling and testing of the water throughout the operation.

(f) General sanitary surveillance of the entire operation.

A system of public information to warn, as well as to reassure, the people in respect to water supply will be necessary. Indicator tests to show quickly changes in the characteristics of the water supply, with provision of more detailed laboratory examination, if considered necessary, should be planned. While a major part of these responsibilities may rest with the local water department, it will need the closest assistance and cooperation from the health and fire departments. It must also have additional hands to do the work. Part of the extra help that will be needed in time of disaster can be recruited and trained locally. However, skilled personnel are required for practically all phases of water supply operation. The quick action necessary in emergency demands persons with judgment based on "know how." In general, this means securing the help of water works men and public health engineers from other communities through mutual aid.

Problems in Waste Disposal During Disasters

While important, the sewage problem does not have the health significance, in emergencies, of the water supply. In gravity systems, sewage will generally continue to be removed, possibly with offense to the esthetic sense, but with relatively little hazard to health. Damage to pumping stations, or power failure, will present a more serious problem. The flooding of basements and possible interference with power, elevator and heating services may make multi-story buildings practically uninhabitable at a time when housing and shelter will be at a premium. Plans must be made to cope with such situations. Breaks in sewers that are in close proximity to water mains must be watched closely; and food supplies in basements or warehouses subjected to flooding by sewage must be located and their safety ascertained.

Failure of the water-carriage waste disposal system in homes, due

to failure of the water supply system, may be a serious problem. The small amount of water distributed by water tanks for domestic use would be insufficient for the hydraulic removal of wastes. Plans for scavenger service, in such an event, should be developed by the municipal department charged with refuse collection, in collaboration with the local health department. Temporary hospitals, rest centers or feeding stations may be located where pit latrines must be used. As with all the other problems enumerated, the sewage problem should be handled by the department or contractor best equipped to do the job, but in compliance with the standards and under the supervision of the health department. Consideration should also be given to such factors as damage to an industrial plant and the discharge of toxic wastes to a stream serving as a public water supply.

equipment and to the product. Lack of refrigeration and breakdown of pasteurization facilities may result from lack of power, water or fuel, or damage to the plant.

Since the quantity of undistributed food in most large cities is sufficient for but a few days consumption, at most, it is questionable whether much time or effort should be expended on elaborate detection procedures or decontamination operations during the critical period of the emergency. Special consideration should be given to the control of food sanitation at feeding stations, temporary hospitals and rest stations. The usual problems of mass feeding will be magnified by the improvised nature of the facilities, inexperienced personnel and urgency of activities.

Sanitation will be a major problem in selecting shelter and temporary housing facilities. The health department, working with others having primary responsibility, must determine space requirements, heating, ventilation, water supply, toilet facilities and other public health necessities. In some cases, calculated risks must be assumed. The public health official is most competent to assess these risks.

Other Types of Problems

The type of disaster contemplated in civil defense may result in enormous quantities of debris and putrescible material which must be removed or destroyed promptly, and at a time when manpower and vehicles are in very short supply. In some natural disasters, the problem of removing and destroying dead animals has been of major proportion. This whole problem should be performed by the municipal department normally providing such service, but with the cooperation and advice of the health department.

Rapid increases in insect and rodent populations following disasters may quickly produce extreme health hazards. Special control measures may need to be put into practice. Where insects or rodents have been responsible for serious diseases, their control may be a governmental responsibility; where their health significance has been less important, control may be by private means. In either case, the health authority has a responsibility.

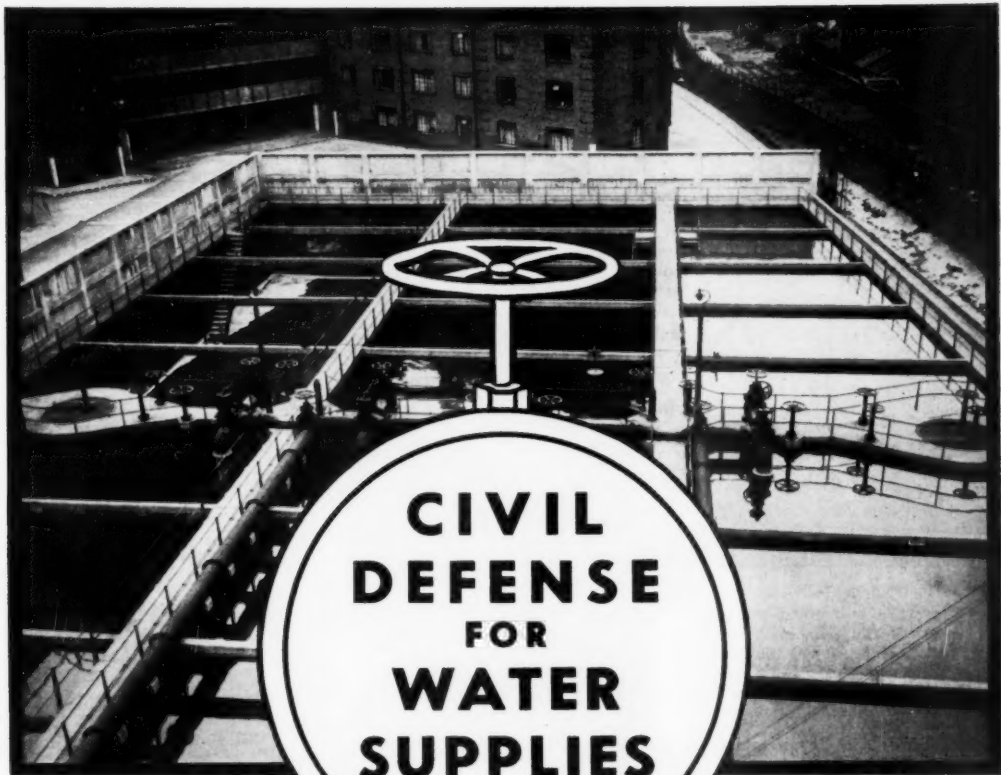
Contamination of the atmosphere, areas or structures by any means will be of concern to the health department. A first responsibility will be to determine the danger and its extent. Decisions must then be

(Continued on page 90)

Controlling Food, Milk and Shelter

Under normal conditions, the production and distribution of milk and many food products are conducted under careful control and close scrutiny of the health department.

Handling is by trained men, utilizing approved methods and modern equipment. Plans to meet disaster conditions must contemplate losses among personnel and damage to the



Combine Photos

CIVIL DEFENSE FOR WATER SUPPLIES

- **ROOF-TOP reservoir London.**
Static storage provided

180 million gallons for fire-fighting and other purposes.

WATER is vital for maintaining human life, for fire-fighting and for the operation of industries. Service, with a minimum of interruption, is essential. This requires that provision be made for effective mutual aid, for adequate protection of plants and facilities, for defense against biological warfare, and for the provision of safe temporary supplies, in case of need.

What Mutual Aid Is

Mutual aid contemplates the interconnection, to the fullest possible extent, of municipal water supplies with adjoining public water supply systems; with the approved water supplies of industries; and with other suitable sources so that, in the event of failure of one supply, continuation of water service may be assured. Mutual aid also contemplates the provision of aid between communities by personnel, materials and equipment.

EARL DEVENDORF

Director, Bureau of Environmental Sanitation,
New York State Department of Health
and State Water Coordinator

In furtherance of these aims, other steps are included as follows:

To bring distribution system maps completely up to date and to have accurate records maintained locally showing location of valves, hydrants and other essential parts of the water system.

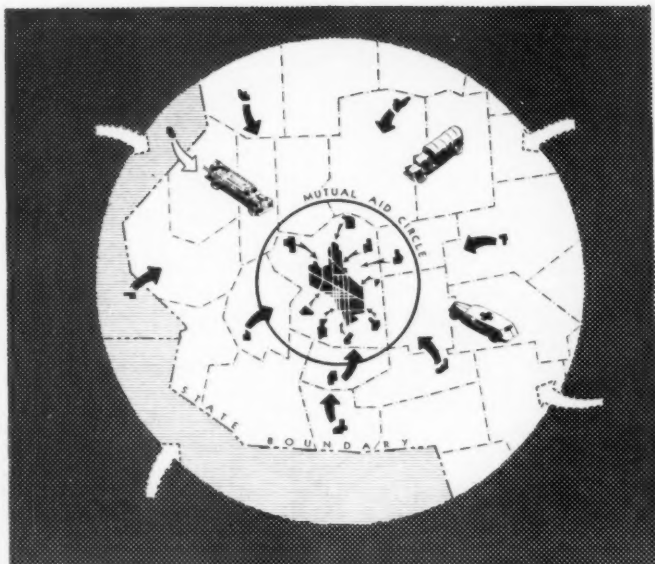
To cooperate with local fire authorities to survey all possible emergency sources of supply and make preparations for their possible use; to supply data to fire authorities on valve and hydrant characteristics; and to make jointly with them a study of the distribution system to ascertain and correct weaknesses in it.

To cooperate with local fire authorities and defense industries in determining the adequacy of water supply and fire protection furnished such industries and in correcting deficiencies.

To cooperate with power companies and other utilities to determine the measures necessary to continue water service in event of power failure.

To cooperate with local defense authorities in integration of plans for the protection and repair of water works with the defense plans of the community; and so arrange the training of volunteer workers in the techniques of water works operation and repair, so that those volunteer workers will be able to aid regular water department personnel.

To make studies of the needs for protection against sabotage and to take all necessary steps to accomplish such protection.



● **SCHEMATIC diagram of organization for mutual aid as outlined in this article.**

edge of the details of the procedures to be employed is essential for each employee, so well as a full appreciation by each employee of what his own particular responsibilities and duties are.

In preparing to meet possible emergencies, it is desirable to plan to meet the worst possible conditions that may arise. In addition to bringing up to date the maps of the distribution system, preparing an accurate record of the location of valves and hydrants, arranging for systematic inspection to insure these are in working order, and making inventories of equipment and personnel, all of which are covered in more detail below, surveys may also be made (in co-

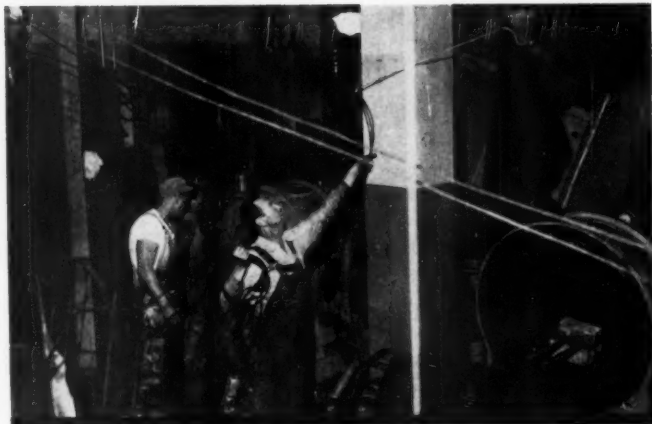
● **TRAINED workmen plus advance planning quickly repair damaged water plant.**

To prepare a detailed inventory of water works personnel, equipment and supplies and file this in the zone office so that needed assistance can be arranged for promptly.

The Mutual Aid Organization in New York

The Mutual Aid Organization in New York State is headed by the State Coordinator and his assistant. Reporting to him are 5 regional coordinators, each with a deputy regional coordinator, who is drawn from a contiguous area. Under these 5 regional are 25 zone coordinators. New York City comprises the 26th zone. Local water supply officials report to their respective zone coordinators.

The basis for the program is, that in any catastrophe resulting in the failure of a water supply, sudden need will always arise for a variety of emergency services and materials, equipment and supplies to enable prompt restoration of service. Unless preparations are made in advance, much time will be lost in locating and obtaining such services and materials. It is impractical to have each municipality purchase all of the supplies and materials that might be needed for a possible emergency. The pooling of resources, through the Mutual Aid Organization, with lists of inventories of materials, supplies and personnel in the hands of zone and regional coordinators permits the



quick interchange of needed facilities.

Whether located in critical areas or not, all municipalities need to be fully prepared to meet all emergencies that may arise, with the assistance, if necessary, of other communities; and all communities should be prepared to assist others.

What a Municipality Should Do

Not only should local water works authorities be fully familiar with the details of the plan for mutual aid and preparedness, so that the fullest degree of cooperation may be attained, but instruction should be given to employees. A knowl-

ordination with other agencies) of privately owned equipment and material which may be available locally. This may include contractors, utilities and industries.

The feasibility of interconnections with adjoining or neighboring water systems should be studied. First consideration should be given to those systems to which connections can be made now at moderate expense. Secondary consideration should be given to those which involve a future long range plan. Immediately possible interconnections should be studied in respect to cost, circumstances of their operation and the value to either com-



Combine Photos

● **FIVE of the many ground level water storage tanks in London which furnished fire protection in disaster.**

munity in case of total or limited water failure. Studies should provide hydraulic data, bills of materials, estimates of cost and every other essential information. Preliminary plans for such proposed interconnections in New York State are referred through the Zone Coordinator to the National Board of Fire Underwriters or the New York State Fire Insurance Rating Organization for appraisal as to value from a fire protection standpoint. Before construction, the plan should be approved by the State Water Coordinator (as required by law); every possible effort should then be made to make the connection as soon as possible.

All of the possibilities of interconnections with approved industrial or other water supplies that exist in or near the municipality should be studied and reported to the Zone Coordinator. The report should include location, hydraulic

data, amount of water available to either the municipality or the industry in event of emergency, and the cost of making the connection. Plans for such connections must be approved by the Department of Health. If the connection is made, the local water authority must exercise supervision over the connection and maintain a check on the quality of the industrial supply after the connection is made. The important consideration is to have interconnections made when they will be advantageous to either the industry or the municipality but to assure that no dangerous cross-connections will be made.

One of the first steps in the program should be to bring up to date and maintain properly the map of the distribution system and the record of valve location. Distribution maps should show location and sizes of all water mains, and location of all valves and hydrants.

These maps are needed not only for proper operation of the system but as a basis for studying the hydraulic capacities and weaknesses of the system. It is especially important that precise data on valve location be available. Under winter conditions, when valve boxes may be covered with ice or snow, location may be nearly impossible unless specific ties are shown to nearby permanent objects. Information should also indicate whether the normal position is open or shut, and the number of turns to open or close.

Where these are recorded only in the memory of local personnel, it is especially necessary that a permanent and usable record be made. Several copies of the data should be available and should be stored in several locations.

Cooperative Work With Fire Officials

In cooperation with local fire officials, a detailed study should be made of all possible sources of water that it might be necessary to use in an acute and severe emergency. This refers primarily to water that might have to be pumped into the mains, not that which might be pumped directly onto the fire. Information should be developed regarding the quantity of water that will be used and the required pumps, chlorinators and emergency connections that will be necessary to make it safely available. Detailed plans and procedures should be prepared covering the use of such water; and, where possible, trial runs should be made to assure that the equipment is ready and that the procedures for safeguarding the water quality are understood by all.

If different types of hydrants require different types or sizes of connections, fire officials should be informed so that fire trucks may be equipped with the necessary adaptors.

The distribution system should be studied to determine the maximum amount of water that can be furnished and the period for which it can be supplied at various key points throughout the community. Consideration should be given to the possibility of damage to extensive areas of the distribution system, pump stations, elevated storage and distribution reservoirs. This study should develop probable bottlenecks in the distribution system, the possibility of connecting lines to provide delivery to important areas from more than one direction,

(Continued on page 92)

TRAFFIC CONTROL

B. A. LEFEVE,

Director, Bureau of Highway Planning
& Chairman, New York State Dept. of Public
Works Civil Defense Committee

ONE of the big questions in most everyone's mind today is "what will happen if an atom bomb is dropped on one of our cities or congested suburban areas? While this can remain a question in many minds, the Civil Defense planner and the public officials charged with the responsibility of proper and necessary action in the event of such a catastrophe, must try to find the answer. And once he has arrived at a reasonable answer he must chart a course of action to be taken when such an emergency occurs.

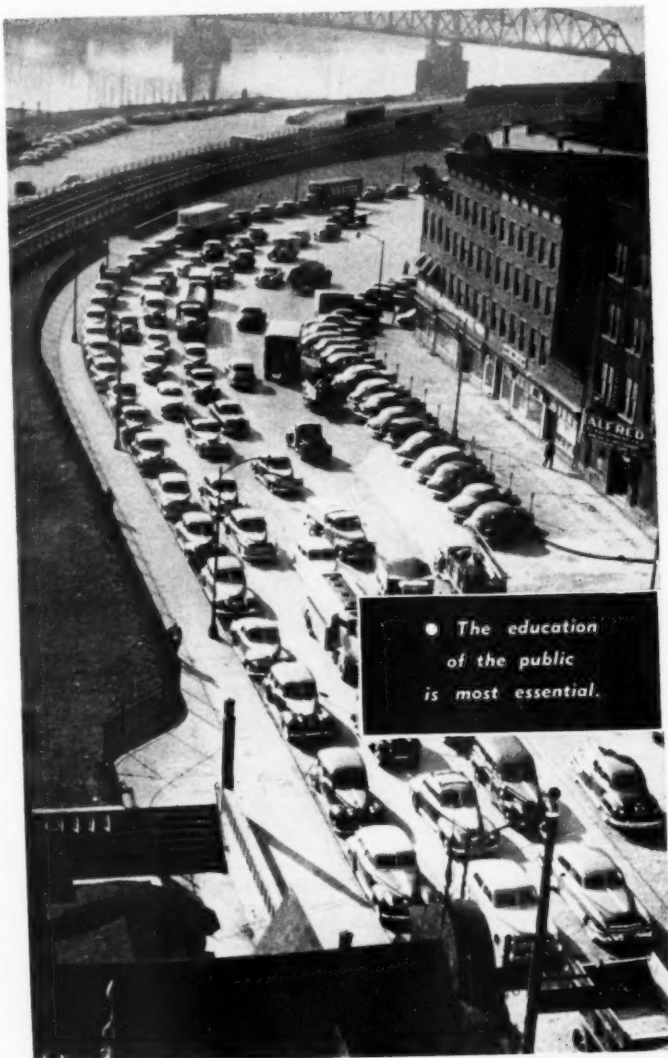
Both the problem and the answer are complex. It is necessary to consider the various phases; establish policies and procedures to cope with each individual phase; and then to coordinate all of the activities into a smoothly running organizational plan. Probably one of the most important of all is the problem of traffic control, not only in the stricken area itself but in all of the approaches to that area. If adequate and timely traffic control measures are not taken the entire plan of mutual aid and assistance will bog down in a maze of clogged streets and highways.

There are four general types of traffic that must be considered:

1. Normal local traffic on the highways and streets at the time of the bombing or emergency.
2. Long distance traffic, especially commercial traffic, destined to the stricken area or through it to points beyond.
3. The potential traffic not yet on the road. This includes the panic traffic and the traffic by persons trying to get away from the disaster area.
4. The emergency Civil Defense and military traffic coming to the assistance of the stricken area.

It is quite evident that, in working out a method or system of traffic control for these four types of traffic, a great many things other than conventional traffic control in any city or area is involved. Consequently basic policy must be determined and the cooperation of many different governmental units must be obtained.

● *THE vital necessity of keeping roads and streets clear of traffic in times of disaster is conceded by every student of the problem. A plan for accomplishing this is presented here by the author.*



● *The education of the public is most essential.*

It is generally conceded that in the event of atomic attack, a stricken city or area will not possibly be able to take care of itself. There is no populated area in this country that is that self-sufficient. No matter how well the Civil De-

fense plans are laid, there is a very real possibility that much of the equipment and material needed to combat the effects of such a bombing may be destroyed in the bombing. Thus Civil Defense becomes a cooperative effort, one of mutual

PLANNING for Civil Defense

aid with no ready method of determining who will aid and who will be aided.

Certain target areas may be considered more attractive targets but the fact that both the invading planes and the defenders operate at hundreds of miles per hour makes nearly all populated areas subject to accidental if not intentional bombing. This situation demands that traffic control be set up not only in individual cities and areas but throughout the whole area of a state and adjoining states.

A simple summary of basic policy or need can thus be stated:

1. Keep all the streets in the stricken area clear of normal traffic, especially the major thoroughfares.

2. Reroute long distance traffic at a point far enough from the stricken area to prevent clogging of highways.

3. Prevent wholesale evacuation and thoughtless panic in the stricken area; evacuate only those absolutely necessary.

4. Provide clear and free access and egress routes to the stricken area from all parts of the state or adjoining states.

It is important that the responsibility for Civil Defense be local. It is also just as important that a central coordinating and regulating authority be established in each state. The State Civil Defense authorities are then coordinated by a Federal Agency charged with that responsibility.

In New York State the Legislature established the New York State Civil Defense Commission with powers:

- a. To prepare basic plans for execution by local offices of civil defense;

- b. To reinforce the local offices of civil defense, when required, with State and other personnel and facilities under the jurisdiction of the Commission;

- c. To assist local offices of civil defense with their initial planning, upon request;

- d. To coordinate the activities of local offices of civil defense, as required, particularly in the matter of evacuation and other plans requir-

ing mutual support by counties and/or cities;

- e. To achieve maximum uniformity of planning on the local level;

- f. To encourage local directors to establish small permanent civil defense staffs, as experience has demonstrated that an efficient organization can rarely be built up with only part-time supervision and direction;

- g. To test from time to time the efficiency of local offices of civil defense; and,

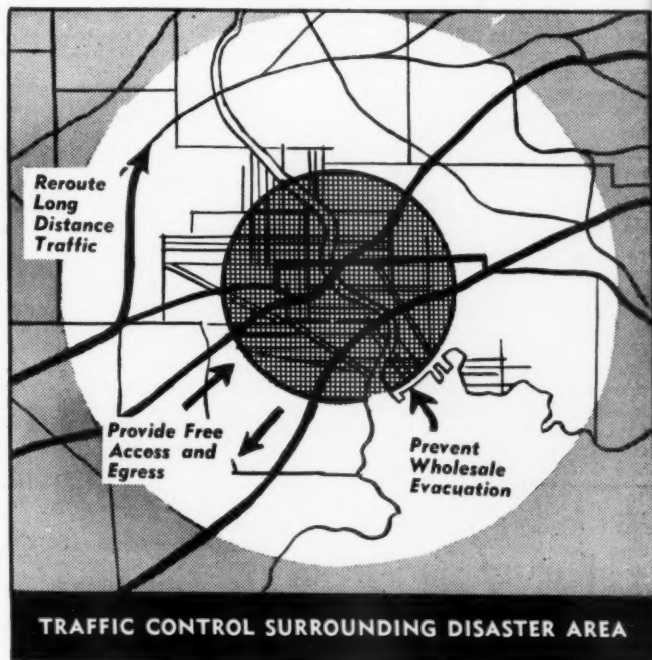
- h. In the event of an emergency to mobilize resources from outside the emergency area for its support and to provide such supervision as may be necessary.

Full local responsibility is thus placed in the hands of a local Director of Civil Defense; one for each county and city. Any county and the city or cities within the county may combine their effort under one director if they so elect. The local director is responsible for

all Civil Defense activities within his area. He can call on the New York State Civil Defense Commission and on all the State Departments and Agencies for assistance in setting up his organization and carrying out his responsibilities.

Establishing Routes

In New York State, the State Civil Defense Commission has charged the Division of State Police, in cooperation with the Department of Public Works, with the responsibility for setting up and establishing routes of ingress and egress to all cities in the State. Both primary and alternate routes have been selected. These routes were designated on the basis of carrying capacity, weight and clearance limitations, ease of control and geographical features. In the event of a disaster or bombing the primary routes leading to the stricken area will be immediately closed to all





● **THIS highway will be closed in time of emergency for all civilian traffic**



● **TRAFFIC volumes like this will prevent prompt despatch of aid to stricken areas.**

traffic except Civil Defense and military vehicles.

These routes will be policed by State and Local Police, National or State Guard, and whatever auxiliary police are required. These are the routes over which assistance, in the form of equipment, supplies, medicines, food, water and men, will flow into the stricken area. Over these same roads the wounded, sick and homeless will be evacuated.

The utilization of limited access type highways for this purpose is ideal, especially from the standpoint of control. Access to roads of this type is easily controlled with a minimum number of police. Even parkways with their sometimes limited vertical clearances are well suited for this purpose. It may sometimes be necessary to reroute large pieces of construction or repair equipment to other routes but the great majority of Civil Defense and Military Traffic can be readily accommodated.

These controlled routes provide for the most important traffic of all: that destined to aid the bombed area. A statewide network is thus available except for routes through cities. In cities it is the responsibility of the local defense director of each city to establish through routes connecting the ingress and access routes established by the State Police. It is also his responsibility to keep these routes clear and available at all times.

Not every access or ingress route throughout the State will be closed in the event of a bombing of one or more areas. All roads into and out of a bombed area will, however, be closed. Routes will be controlled to a point far enough away from an emergency area to insure a free flow of mutual aid into and out of the area.

Large signs to remind the public of this fact are being placed along some of these routes near major cities in New York State. They indicate that the highway will be

closed in the event of bombing of that specific city. Certain other routes, not signed, will also be closed.

In the case of New York State, details of this plan are being worked out and coordinated with those of adjacent states. In this manner, critical areas will be served adequately regardless of the location of state boundaries.

Long distance commercial vehicles en route to very large cities, or those which must pass through large cities become a problem in the event of a bombing of the city. To take care of this situation it is desirable to set up a cordon at a considerable distance from the emergency area. In this way much vital traffic can be rerouted to or around the city as the case may be. This again will often require the cooperation of two or more states and must be so organized that it can be activated at a moment's notice.

Regulations for Control of Traffic

It is realized by those charged with proper planning for Civil Defense that the traffic problem will become more acute, the nearer the approach to the emergency area. As indicated previously, this is the result of local traffic, panic traffic and, in a relatively short time after a bombing, the mutual aid traffic. It should be readily apparent that the only traffic that is actually necessary immediately after the bombing is the mutual aid or organized Civil Defense traffic. It is therefore not only desirable but an absolute necessity to intercept and stop all other traffic.

In New York State the Civil Defense Commission has set up the following regulation:

1. No vehicular traffic other than Civil Defense and military vehicles, or supply vehicles cleared by Civil Defense authorities, may move into or out of a city which has sustained enemy attack, for a period of at

least twenty-four hours after such attack.

2. No private vehicles may be operated within the boundaries of a city which has sustained enemy attack, without authorization of the local Civil Defense Director.

3. The penalties provided in Section 209 of the State Civil Defense Law shall apply to any person violating this regulation.

Local Directors, therefore, should incorporate into their procedures a provision that at first alarm every motor vehicle should pull to the curb or off the pavement and remain there until authorized to move by proper police authority. This should be rigidly enforced by regular and auxiliary police. The general public should be repeatedly instructed in this matter through a complete educational program in every area. This is the only way that streets can be kept open for fire equipment, medical and rescue teams, nurses, clearance units, food, water and the other necessities. All streets will be needed for the assembly and movement of the Civil Defense forces within the city itself. In the first hour or two, thousands of injured will either live or die, depending on how quickly aid can reach them. Aid can get to them only over open streets; not by streets clogged with cars and vehicles.

Probably one of the greatest problems will be the control of panic traffic. Some people will want to get into their cars and rush out of the city or damaged area. To control properly this type of traffic a great deal of educational work must be done now, before anything happens. It must not be a one-shot program; it should continue until every resident of every city and populated area knows what to expect, what to do and what not to do.

Don't Leave Home

A little thought will show that far more damage and injury will
(Continued on page 96)

CIVIL DEFENSE *for the* **SEWAGE TREATMENT PLANT**

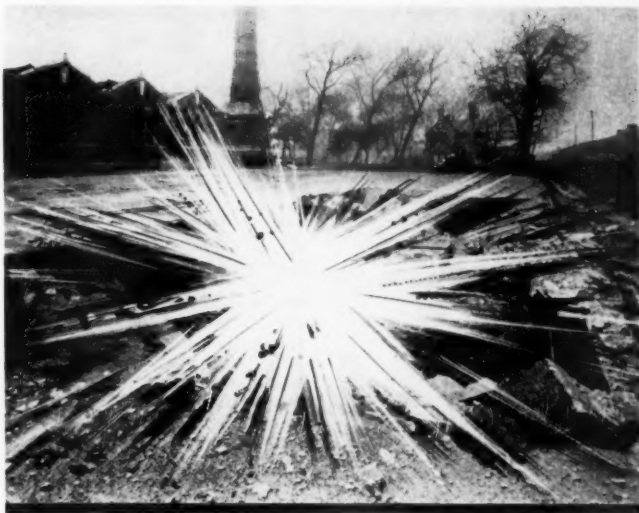
RALPH E. FUHRMAN

Superintendent of Sewage Treatment,
Washington, D. C.

CIVIL defense measures suited to industrial plants require some modifications and additions for application to the sewage treatment plant. Consideration must be given to the possibility of having buildings flooded by broken sewage or sludge lines; and the possible formation of an explosive and suffocating atmosphere in buildings by broken sludge or gas lines requires additional precautions. In some locations, the pollution of streams by raw sewage will create serious public health problems. The storage of relatively large amounts of chlorine used for disinfection odor control or coagulation presents other hazards. The majority of civil defense measures for a sewage treatment plant, however, are those applicable to industrial plants and public buildings.

No one set of civil defense procedures is applicable to all sewage treatment plants. Plants with over a hundred employees will require a much more elaborate set-up than one that is operated by a single individual. The six thousand or more sewage treatment plants in this country vary greatly in size and complexity and procedures applicable to one may not be required at all at another.

Certain precautions can be taken, with little expenditure of time or money, which will produce valuable returns in the event of an emergency. First, is the storage at more than one place of detailed drawings of the plant, including those showing the location of plant conduits and pipe lines. It is desirable that these locations be tied to permanent objects for quick reference. It would be wise to store a duplicate set of plans and reference tie-ins in a location at least five miles distant from the treatment plant. An up-to-date list of the plant personnel, together with their addresses and phone numbers, should be distributed to the plant personnel as well as to the local civil defense organization. This may



Combine Photos

● **SEWAGE** pumping station in London was hit by a bomb. Overflowing sewage may present a serious health hazard unless cared for.



Courtesy Dorr Co.

● **SEWAGE** treatment plants are more subject to natural disasters than to enemy attack, but should be prepared for all emergencies.

save much time should it be necessary to locate a particular individual. Other lists should be prepared to include persons employed at neighboring sewage plants who can help in operation in an emergency, and local firms carrying spare parts for the plant equipment. It should be possible to exchange storage space for such records with another agency located some distance from the treatment plant to the mutual advantage of both agencies.

Civil Defense Organization

Civil defense organization for an industrial plant or public building is usually divided into four general services: (1) police services; (2) fire services; (3) health services; and (4) maintenance services. The limited number of employees at many sewage treatment plants makes it necessary for a single individual to be familiar with the work of all the services. The four services listed above will be discussed in more detail after a general discussion of the type of damage that is most likely to occur.

According to a recent publication of the Civil Defense Office, radioactivity is not the atomic bomb's greatest threat. It is stated that in most atom bomb raids, blast and heat are, by far, the greatest dangers that must be faced. Since sewage treatment plants are usually situated on the outskirts of a community, there is an even better chance that they will be far enough from ground zero that radioactivity will not be a major problem. It appears that the greatest danger of radioactivity will come from materials washed into the sewers and carried by them to the treatment plant, where they will probably be concentrated. There will be a time lag before this occurs so that it does not require immediate attention during an attack. It would appear that, in working out a civil defense program for the sewage treatment plant, protection from sabotage, blast and fire should deserve the most consideration.

Police and Fire Services

The primary function of the Police Services at a sewage treatment plant is the prevention of sabotage. In order to keep unknown persons out of a plant the usual procedure is to provide adequate fences and to have a guard at the entrance to the plant. Identification of employees by the guard is facilitated by issuing passes which have a photograph of the employee attached to it. Identification badges worn by



● **SURE and rapid communications expedite operations.**

the employee will enable anyone on duty to spot a person not wearing a badge. Employees should be screened to eliminate any possibility of having a "fifth columnist" in the organization. Adequate lighting at night makes it more difficult for a stranger to enter the grounds unnoticed. The police services are also responsible for enforcing blackout regulations.

Protection against loss by fire is the duty of the Fire Service. With the exception of such structures as sludge storage buildings, the average sewage plant does not contain much combustible material. Adequate extinguishers should be available at those locations likely to be damaged by fire. At those plants which collect and store sludge gas, the possibility exists of having a gas line ruptured and it would be well to cut off the supply of gas to all buildings as soon as possible after an attack. The suffocating nature of sludge gas makes it necessary to use a type of mask with an independent supply of air in order to enter a location where the gas is present. The plant should be surveyed and, where possible, combustible materials should be removed to locations where they would do a minimum of damage in the event they were ignited. As an example, it would be better to store drums of oil outside rather than in the basement of a building in which there are employees. The practice of good housekeeping is even more important as a civil defense measure. The plant fire services are intended to supplement the fire services of the community which will be hard pressed in the event of an emergency.

Health Services

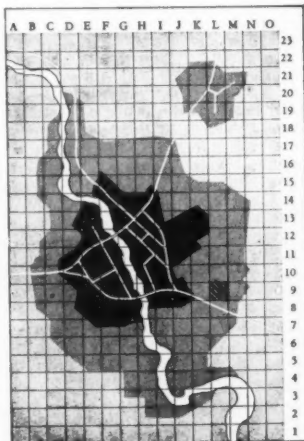
The Health Services of a plant care for the injured and detect, and if possible, eliminate hazardous conditions. Employees should be encouraged to obtain training in first-aid measures. First-aid stations should be spotted throughout the plant and should be located in rea-

sonably well protected areas. Protection against "special weapons", such as atomic, chemical and biological warfare, is also a duty of the Health Services. With "special weapons" the sewage plant might escape damage at the time of attack, but dangerous areas may develop at a later time. Following an attack where chemical agents were used, it is possible that a considerable amount of the chemical would be flushed from the streets and, in the case of a combined system, find its way to the treatment plant. Since most chemical agents are fat solvents, they would probably accumulate in the scum at the sewage treatment plant. In this event, protective clothing and gas masks would be necessary for the plant employees exposed to the sewage.

It has been stated that when an atomic bomb explodes in the air, most of the radioactive materials are carried away by the blast and only minor amounts settle to the ground. If the small amount of radioactive material from large areas were flushed into the sewers, it seems reasonable to assume that it could be reconcentrated at the treatment plant. If this condition were to occur, some sort of monitoring instrument should be available to detect concentrations of radioactive particles. Plant personnel should be kept away from "hot" locations until arrangements were made for special disposition of the material.

The sewage treatment plant should be prepared to handle "night soil"

(Continued on page 100)



● **GRID system overprinted on city map aids location.**



INSECT AND RODENT CONTROL IN CIVIL DEFENSE

CONTROL of insects and/or rodents following a disaster may or may not be necessary. Need will depend on the season of the year, the possibility or probability of disease or of nuisance, and, to some extent, on the geographical location of the community, as north or south. However, complete plans, based on a survey of local conditions should be prepared and the necessary materials and equipment determined and arranged for. It may not be important to start the work immediately after a disaster occurs, as some time, depending on climatological conditions, may be necessary to build up the rodent or insect population; but neither should such population be allowed to build up appreciably before work is started for control measures then may be very difficult and require some time to take effect.

Mosquitoes might be produced in very large numbers if high waters overflowed a considerable area of land and, upon receding, left pools and swampy areas. Local health officials can tell whether or not such mosquitoes would be likely to produce an epidemic of disease; but if the overflow occurred in the warm season, a very great nuisance would be almost certain to occur. A hurricane and storm might produce the same general result; and also a serious explosion. Mosquitoes may spread malaria, dengue and yellow fever, as well as some other disease of less general importance; but is doubtful if, under normal conditions, mosquitoes would present a serious disease problem.

In a major disaster, with many

people killed, with food stocks broken open and with garbage uncollected, flies might be a tremendous problem, especially in hot weather. Directly, flies do not carry any important disease, but they may transmit mechanically the causative organisms of the so-called filth-borne diseases, as well as others of lesser importance from the public health viewpoint. With a great many flies, poor disposal of body wastes (which is likely to be the case for a time, at least) and open air feeding of people whose homes have been destroyed, the disease problem might become most serious.

The body louse transmits typhus fever which, in the past has been known as one of the great killers

of history. In this country it is unlikely that typhus would appear, but it could be a hazard if it were necessary to house people in crowded masses, with inadequate bathing and laundry facilities. Typhus can be controlled by inoculations, but this is hardly feasible with great masses of people. Body lice can be controlled by dusting with DDT, which is a relatively simple, inexpensive and quick measure.

Rodents would be unlikely to spread disease in this country under most disaster conditions, but could be a hazard if biological warfare were employed. The ectoparasites that normally live on rats can transmit bubonic plague. In the United States (probably mainly west of the Mississippi River) a related form of plague exists, called sylvatic plague, but this disease has not been a serious one during the past fifty years. However, there is some evidence that it is possible to have bubonic types of plague develop from the sylvatic type. Though the danger appears very small, it is nevertheless desirable that advance planning for civil defense should take account of the problems of rodent control, and should consider all probabilities.

Planning the Necessary Measures

In the light of local conditions, an estimate should be made of the probable needs for rodent and insect control measures following a disaster. A suitable committee to study the overall problem might include an engineer, a health de-



Tri-Boro Photos

● **CONTROL of mosquitoes and other insects, and of rodents may be essential for protecting public health.**

partment representative and a pest control operator. Evaluation of the probable needs for control and the type of vermin to be controlled (planning should always include rodent control) is a function of the health department. Advice on the various methods of control, their effectiveness, and which method would be best for each specific condition can be given by the pest control operator. Actual problems of organization and administration for control is an engineering problem and should be handled by the engineer.

With the overall need and the general measures for control broadly determined, detailed plans should be prepared to carry out the work that has been determined as necessary. A committee representing the local pest control operators should be formed to aid in preparing plans.

A good method of procedure is to assume a number of the conditions that may occur—a flood, a hurricane and storm, a bombing attack and biological warfare attacks—and to work out a broad plan for each. When these plans are compared, it will generally be found that many of the problems to be solved, no matter what the type of disaster, will be broadly similar. With such data analyzed, it will be possible to work out unit teams or groups which will be capable of doing the work that is necessary. The equipment, personnel and materials, as well as the work that can be expected from each of these being fairly well known, the number of teams and the equipment and materials requirements can be determined. It is advantageous that the hard core of these teams be small and as completely self-contained as is possible, but that organization permit additional personnel to be attached to them.

As an example, if units for mosquito control by oiling or larvaciding are considered necessary, an oiling unit might be set up to consist of a light truck, a driver, a foreman and three oilers. Equipment might consist of four knapsack sprayers, a small fogging machine, two dusters, 2 shovels, 2 picks, 150 gallons of oil and 50 pounds of DDT or paris green dust (if anopheline mosquitoes are expected). With an oil and dust supply depot from which to draw, such a unit would require only a small amount of oversight to control the area assigned to it in advance.

As a matter of fact, this same unit with very few modifications

would be equally effective for fly control. By substituting BHC, DDT or Chlordane compounds for the oil, good fly control could be obtained.

On mosquito control work, oil is somewhat simpler to obtain during an emergency than DDT or similar compounds that need special handling or mixing. In regard to the amount of oil, computations may be made about as follows: An allowance of 15 gals. of oil per acre of water surface may be assumed. If a DDT or similar emulsion is to be used, 0.5 to 1 pound of DDT should be allowed per acre of water surface. On swamp land, somewhat overgrown, and along brushy streams, one man will spread 35 to 50 gallons of oil in a 9-hour day. Since oiling of this type is very tiring physically, few men can spread oil for more than 9 hours in hot weather. These figures, modified in the light of local conditions, may be used as a basis for estimates.

If spraying for either mosquito or fly control is planned, using a light plane, it may be assumed that a properly equipped light plane (none other can be used) will carry about

60 gallons of DDT mixture; if this is 5% strength, about 25 pounds of DDT is available for spreading on one flight, which will treat 30 or 40 acres of area. Winds and other weather conditions may interfere with airplane application. Therefore, provision should always be made for ground crews.

Rodent control measures will depend on the type of problem anticipated. If rats are a pest only, poisoning is most effective; if, through biological warfare, disease (such as plague) should be a threat, the problem is more complicated. Mass killing of the rats by poison would encourage the infected parasites to leave the dead rats to find other hosts. Therefore, liberal use of DDT or some other insecticide should be made. This is best used in the form of dust, applied to runways, burrows and harborages, to kill the parasites. The use of DDT should precede poisoning.

With the advice of the local pest control operators, rat control units may be formed. These should have transportation, a stock of poisons, DDT dust and transportation, plus other minor equipment.

Details of the Planning Work

The general procedures to meet all anticipated emergencies having been determined, and the number and composition of the various control teams having been established, the overall needs for materials and equipment can be computed easily. There will be required DDT and other insecticides; diesel oil; rodent poisons; application equipment, as sprayers, foggers, dusters and misters; and the necessary small tools and transportation. With such requirements estimated, local stocks can be surveyed to determine needs for purchase and/or stockpiling; or for mutual aid agreements with neighboring communities. Every community should have available a reasonable amount of the essentials for control, though any excessive stockpiling should be avoided; in fact, stockpiling should be held to a minimum. The local pest control operators can be of great service in such ways as (1) determining which materials are most effective and which materials may be used, if available; (2) estimating amounts of materials needed and the rate of consumption under various conditions; (3) advising on local sources of supplies for both materials and equipment; (4) advising on

use of substitute equipment which may be available locally; for instance, dusters may be used instead of oil sprayers, if both dusters and dusting mixtures are locally available; and (5) in training personnel for this work. Also, the pest control operators may be assigned as foremen and area supervisors for the work.

The extent of the preparation for insect and rodent control work should be based on probable need. In northern areas, where the need for such measures is unlikely to be overwhelmingly great, and where insect and rodent populations may be expected to develop more slowly, so that several days may elapse between a disaster and the initiation of complete insect and rodent control measures, the control plan may be set up on a stage basis. The first stage of effort—a limited scale program—should be available, if needed, on the day following a disaster; and augmentation of effort, probably doubling of the initial effort, should be possible by the third day, with still further augmentation later, perhaps with allowances for mutual aid from adjoining or neighboring areas. Later increases may have to be made, based on need.

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"IT'S THE FASTEST, MOST EFFICIENT EXCAVATING TOOL I HAVE USED"

—A. J. METLER, Contractor

"During the past several years," Mr. Metler says, "I have owned and operated four conventional full revolving crawler and truck mounted shovels and cranes and know that they have a direct application to many types of excavating work."

"On the other hand, I have learned that the fast operation of the tricycle mounted Dempster-Diggster permits it to be used on certain types of work to a considerable advantage. Its mobility permits quicker transfer from one job to another."

"I have had excellent results from the Dempster-Diggster and consider it the fastest and most efficient excavating tool I have used."

Mr. Metler is one of the many contractors who has found the Dempster-Diggster to be "the fastest and most efficient excavating tool" available.

This speed and efficiency in excavation work is accounted for, mainly, by the Diggster's exclusive independent hydraulic crowd and hoist action, its hydraulic steering and wheel-type traction.

The power crowd permits bucket to keep digging until loaded . . . no digging with wheels. The hydraulic steering gives the driver sensitive, easy, finger-tip control. When accelerated, a one-handed twist of the steering wheel puts the machine in any desired position. By operating on rubber-tired wheels, the Diggster, of course, can move at the fastest possible speed on the job and to and from jobs.



The Type HL Dempster-Diggster is equipped for extraordinary high dumping. The bottom of bucket is 13 feet six inches above ground.



HERE IS THE NEW TYPE HL DEMPSTER-DIGGSTER shown excavating with a $1\frac{1}{4}$ cu. yd. (heaped) digging bucket. The Type HL Dempster-Diggster will dig through an 18 foot bank while the Type GRD digs through a 15 foot bank.

The Dempster-Diggster is a "must" for contractors, large or small operators alike.

The Dempster-Diggster has a 15 foot turning radius, is 20 feet long when bucket is in traveling position, and is nine feet and six inches in height.

Four standard interchangeable buckets of two types are available. Digging buckets with four bottom teeth in 1 and $1\frac{1}{4}$ cubic yard (heaped) capacities, and materials handling buckets in $1\frac{1}{2}$ and 2 cubic yard (struck) capacities.

For fast, efficient operation in difficult terrain, the Diggster is available with crawler-type traction.

"I have not personally used the Dempster-Diggster mounted on crawler treads," Mr. Metler said, "but have seen it in operation on jobs adjacent to mine. I know it is a very effective tool and has many applications."

Construction men have found that on big jobs the Dempster-Diggster has no equal for working in tight places and for freeing big shovels for heavier work. The Diggster has an 8 foot 10 inch crowing reach, will dig through a 15 foot bank, and will dig 15 inches below grade.

Pound for pound, the Dempster-Diggster will out dig and out load any other available competing machine in tough going! Let us prove that statement!

Write today for complete information and prices. The Dempster-Diggster is a product of Dempster Brothers, Inc.



This is the type GRD Dempster-Diggster, which Contractor A. J. Metler considers "the fastest and most efficient excavating tool I have used." It is shown digging 15 inches below grade.

**DEMPSTER
DIGGSTER**

DEMPSTER BROTHERS

941 Dempster Bldg.
Knoxville 17, Tenn.

For more details circle No. 315 on Readers' Service card



TRAILER COACHES FOR TEMPORARY HOUSING

EARL BRATTON
Trailer Coach Mfrs. Assn.

WAR today, whether it is being fought in Korea or the middle west of the United States, is mobile in nature. Housing shelter, too, must take on this mobile character in a period of defense. During the past ten years the trailer coach industry has developed the perfect mobile home. Today civil defense officials know that existing mobile home facilities can be drafted into the civil defense program with little effort.

An actual demonstration of the effectiveness of using trailer coaches for emergency housing was proven in Chicago during the summer of 1950. "Operation Shelter" was the trailer coach industry's answer to what could be provided for emergency housing in the event of an atomic bomb attack. Mobile trailer coaches recruited from manufacturers and dealer sales lots in the Chicago area alone would provide at least five hundred mobile homes in a matter of a few hours. By drawing from surrounding areas, it would be possible to provide from three to four thousand mobile homes within 12 to 36 hours at any designated strategic location. More than half of these trailer coaches could provide sleeping accommodations for six people and the remainder for four people. Staging areas could be located in forest preserves or parks which could provide the necessary sanitary facilities. It has also been suggested that the infield of race tracks be used.

● **WITHIN a few hours, Chicago could provide three to four thousand trailers for housing victims made homeless by disaster.**

Other Phases in Civil Defense

This is only part of one of three phases of the trailer industry's part in civil defense. Government legislation proposes to include mobile housing for military and civilian construction workers required in carrying out of national defense activities in remote areas. In this effort, trailer coaches are the answer to providing housing of a mobile nature which is needed by construction workers in one location for an indefinite period and for subsequent use in other locations.

Trailer coaches sold to military personnel and government workers represent 90 per cent of all sales to private purchasers. These trailer coaches are used by construction workers who will move from place to place in building or reconstruction of remotely located war plants.

Speaking before Congressional Committees on defense housing, Earl Raymond of Raymond Products Company, representing the Trailer Coach Manufacturers Association and the Trailer Coach Association (West Coast) said, "Al-

most every army, air force, or naval base upon the continent today has established trailer parking facilities for mobile homes owned by military personnel.

"We understand from camp officials that as National Guard divisions and reservists are called into reactivated, temporary camps, usually located in remote areas, one out of every five men is accompanied by his family. These men are turning to trailer coach mobile homes for their housing requirements.

"Not only does the trailer coach furnish the military man immediate housing for his family, but should he be transferred within the United States his family can accompany him with no fear concerning housing accommodations. If he is ordered out of the country the family can still take their mobile home back to their home town."

Special trailer coaches have been designed and constructed to provide sanitary facilities; barracks, offices, and medical and dental offices and laboratories, as well as laundries and restaurants.

Effects on Humans of Chlordan, Aldrin and Dieldrin

A study has been made of the effects of chlordan, aldrin and dieldrin on 22 workers who had been exposed to them in a manufacturing and formulation plant for one to three years. There was no evidence of any deleterious effects on the central nervous system, the liver, the kidneys or the hemopoietic system. It is thought reasonable to assume, therefore, that under present conditions of formulations and use, chlordan, aldrin or dieldrin will not produce harmful measurable ef-

fects among persons who are continuously exposed to concentrations which are encountered in ordinary conditions of use. These data are from the *Archives of Industrial Hygiene and Occupational Medicine*, January, 1951, and are reported by Princi and Spurbeck.

Size Limit on Garbage Cans

Superior, Wisc., has limited the size of garbage cans to a standard 30-gallon size. The city supplies wooden racks one foot high to keep the cans from freezing to the ground.—Public Management.

HERE'S HOW FOSTER SIRENS FOR



FOSTER
TYPE 45
SIREN

Meet CD Requirements:

- They are **HEARD**

125 to 130 decibels at 100 ft.—High enough to overcome a street or shop level of 70 to 80 decibels with plenty to spare. Non-directional.

- They are **RECOGNIZED**

Sharp, distinctive howl is instantly identified as a warning.

- They are **ALWAYS READY**

Start instantly in coldest weather. Simple and rugged mechanically with few moving parts. Practically fool proof.

- They are **VERSATILE**

Require a steam supply of less than 1500 lbs. per hour at 75 lbs. pressure, available in most laundries, utilities, and industrial processing plants. Can be manually operated or solenoid operated and tied in with other units in the warning system.

Comparative tests show Foster Sirens are lowest in cost per square mile covered. They are simple to install and are low in operating and maintenance costs thereafter.

There are Foster representatives in principal cities. Ask for Bulletin 29.

FOSTER ENGINEERING

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Company

PRESSURE REGULATORS...RELIEF AND BACK PRESSURE VALVES...CUSHION CHECK VALVES...ALTITUDE VALVES...FAN
ENGINE REGULATORS...PUMP GOVERNORS...TEMPERATURE REGULATORS...FLOAT AND LEVER BALANCED VALVES...
NON-RETURN VALVES...VACUUM REGULATORS OR BREAKERS...STRAINERS...SIRENS...SAFETY VALVES...FLOW TUBES

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Civil Defense Concepts

(Continued from page 61)

sumer demand would extend much over the 12-hour period. Therefore, the availability of additional trucks for hauling the water would be balanced against the provision of the necessary storage at the water points. Further, similar assumptions may be made to determine the number of water points required. This will vary largely with the facilities provided for distributing the water. Since teams of fairly

skilled personnel would (or should) be required at the water points, it may be better to make them large enough to serve 1,000 to 2,000 people per day.

The problem just illustrated will be largely a hypothetical one in any city with a well-constructed water distribution system, having sufficient valves to localize the area from which water must be shut off. However, if the principal main coming into the city were affected, such water distribution might be needed for several days, in both damaged and undamaged areas.

Generally the same type of procedure should be followed through in respect to natural disasters or biological warfare attacks, consideration being given also to housing, care of the injured, burial of the dead and supply of food, clothing and other necessities.

Based on these studies of possible disasters, the operating divisions will be able to develop plans for each; and it will be found that the problems in each case will vary to an appreciable extent only in severity and in location. The general pattern will be about the same.

Things to be Considered

The details to which consideration may or must be given are innumerable, but there are primary factors which must be considered. Some of them will be covered briefly in this section.

It is generally desirable that the work be broken down into basic jobs, utilizing standard teams of crews. The water supply problem already discussed requires three basic types of units, each with its own equipment and materials—the procurement and loading unit, the hauling teams and the water point units. Each will require certain special equipment; each will have a certain capacity for work, largely based on the pumps, emergency chlorinators, storage and distribution equipment and tank trucks, plus such materials as portable lighting units, and water supply chemicals. Likewise, a street opening and clean-up crew would require trucks, bulldozers and motor graders, plus small tools and possibly emergency lighting equipment. Sewer and water main repair crews may be of the standard type regularly used for such work. If mosquito or other insect control work is deemed probably necessary, an oiling crew would be composed of a truck, truckdriver, foreman, oilers, oil supply, sprayers, dusters, etc.

The personnel and equipment of each crew having thus been determined, as estimate can be made of the number of crews required for the maximum probable situation; and from this the items of equipment needed and the number and skills of personnel.

There are advantages in the unit team arrangement, with each as self-contained as is possible. First, it facilitates mutual aid and mobile assistance for neighboring communities, since complete teams, fully equipped and ready to work can be sent out. These will not need to be

CARPENTER

CIVIL DEFENSE LIGHTS



30 Hours Continuous
Light On Each Bat-
tery Charge!

EMERGENCY RESCUE LIGHT

For first-aid, rescue and demolition squads, industrial plants, railroads, utilities, police, fire, highway departments, etc.

Indispensable when emergencies strike... this dependable Carpenter light will help save lives and aid in disaster control! Powered by heavy duty, rechargeable long-life battery, a special Carpenter 2-filament bulb furnishes work or rescue light for 80 hours on one filament... or a high power floodlight for 20 consecutive hours (much longer if used intermittently). 3-way toggle-operated switch controls both filaments. Shatter-proof lens... rugged cast aluminum case... highest quality throughout.

WATCHMASTER STAND-BY PANIC LIGHT

Emergency light the instant power fails!

Prime targets for enemy bombs and sabotage are power sources, transportation and communication centers and defense plants. If bombs drop and lights go out, the first 60 seconds are vital! Watchmaster snaps into action the instant current fails. A "must" for places of public assembly... wherever people congregate... or wherever operations must go on.

Quickly installed wherever there is an electric outlet. Illuminates 10,000 square ft. for approximately 4 hours. Built-in trickle charger maintains battery charge. Built-in fast charger quickly restores charge after emergency. Completely automatic, fool-proof and dependable. Underwriters' Laboratory Approved.

Write today for the 1951 Civil
Defense Issue of our catalog.



CARPENTER
LIGHTS
LEAD THE WORLD

PORTABLE FLOOD and SEARCHLIGHTS
COLORED WARNING LIGHTS
AUTOMATIC STAND-BY
LIGHTS

CARPENTER MANUFACTURING CO.

BOSTON-45-SOMERVILLE, MASS.

"Master-Light-Makers for 36 years"

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More than timely - URGENT!

pattern for SURVIVAL

A Documentary Film That Shows HOW TO SAVE LIVES AND PREVENT PANIC IN CASE OF ATOMIC ATTACK

By Alberto Baldecchi

Featuring WILLIAM L. LAURENCE, noted Scientific Writer for The New York Times — the only newspaperman who covered the entire Atomic project.
Filmed with the cooperation of the Armed Forces and the American Red Cross.

IN CASE OF ATOMIC ATTACK . . .

What would happen in your city? Are you prepared?

Here is a 20-minute sound film that shows you what to do when you get warning . . . what to do if you get no warning . . . where to find shelter inside or outside of buildings . . . what materials for survival you need in your factory, office, school, home, etc. . . how to cleanse yourself of radioactivity . . . how defense workers are prepared to protect you . . . and much more practical, essential information that can save many lives.

A FILM FOR EVERYBODY — NO SHOCKING SCENES

You see people at work, at home, driving, etc., during the kind of air raid that may hit your city. You watch these people defend themselves against blast, heat and death-dealing radiation.

Also, this well-planned film shows graphically how the atomic bomb works and why it is so dangerous. You see views of atomic explosions that are released here to the public for the first time.

Through action and drama, PATTERN FOR SURVIVAL tells you how to stay alive in an atom blast. Welfare, industrial, civic and business organizations all over the country are ordering this new film by the hundreds, now.

Show PATTERN FOR SURVIVAL in your city! It's the best kind of foresight . . . and good sense.

FIGHT FEAR WITH KNOWLEDGE . . . AND YOU MAY NOT HAVE TO FIGHT PANIC LATER.

PATTERN FOR SURVIVAL has been screened and approved by:

Institute of Life Insurance
American Cyanamid Company
National Association of Manufacturers
Fordham University
New York City Department of Health
New York State Civil Defense Commission
New Hampshire Office of Civil Defense
Order of Masons, Department of Hospitals
International Municipal Signal Association
— and many other companies and organizations.

Available in 16mm sound; color and black-and-white
Ask for this vital film at your film library. Or phone, write or wire to Cornell Film Company today.

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BUSINESS, GOVERNMENTAL AND WELFARE GROUPS SAY:

INSTITUTE OF LIFE INSURANCE:
"The picture made a tremendous impression . . . we have had a number of inquiries from various members of our staff wanting to secure prints for showings before groups."

AMERICAN CYANAMID COMPANY:
" . . . the film admirably got across its important message most effectively . . . the film represents a great deal of imagination, master showmanship and originality."

NATIONAL ASSOCIATION OF MANUFACTURERS:
" . . . an excellent job for the purpose of inspiring interest in . . . defense."

JOINT LEGISLATIVE COMMITTEE ON INTERSTATE CO-OPERATION, STATE OF NEW YORK:

"I like the film's emphasis on safety and candor. Without over- or underestimating the problem of living with the split atom, it provides a sound briefing on individual protection if the worst occurs."

OFFICE OF CIVIL DEFENSE, STATE OF NEW HAMPSHIRE:
"The response of the audience was definitely favorable . . . the film is a workmanlike job . . ."

ORDER OF MASON, DEPARTMENT OF HOSPITALS:
"From the comments of the members present, this was the most interesting and educational film that they have ever seen . . ."

outfitted nor to have more than general supervision after having been assigned a task. Second, when the maximum requirements for all kinds of work have been computed, it will almost invariably be found that there are not enough skilled men and equipment to meet them. If units have been carefully organized, they can do more than one kind of work. For instance, during World War II, the Army organized Malaria Control Units which had a very large share in controlling malaria; when tick-borne disease became a problem in the Pacific,

these teams were utilized. Later, they were employed for rodent and fly control; and in many cases were utilized also to supervise the quality of field water supplies, and even to operate water treatment plants. A team or unit headed by a sanitary engineer will be able, with a little training, to handle a wide range of health protective work during disaster—insect or rodent control, emergency water purification, water or sewage plant operation, and repair of damaged water mains or sewers. Likewise, a unit headed by a construction engineer can open

up blocked streets, prepare bridge or pontoon approaches, participate in demolition, repair water works structures, build shelters, and do many other kinds of emergency work.

Careful consideration to the make-up of unit teams and the skills to be utilized by them, plus provision, either initially or in depots, of suitable equipment and materials, will result in teams which are able to do many kinds of work. They may then be assigned, in an emergency, to that work which needs most seriously to be done; also, coordination of teams sent in by other communities will be more easily possible.

Efficient Equipment is Necessary for Effective Disaster Control



You will need the most modern Pipe Cutting equipment in order to make prompt restoration of service in the event of "Bomb" damage. Smashed gas and water mains and sewers give a tremendous urgency for prompt repairs.

This portable milling machine on wheels, can serve and save on regular construction and replacement programs. It can be a life saver if an emergency hits your city.

Here is a fast, portable pipe cutting machine that will take all sizes of cast iron and steel pipe from 10" in diameter on up. Makes cuts under water or in the presence of explosive mixtures. Adequate Civil Defense Protection requires that you have one or more of these machines available in your city.



Write or wire today for descriptive, illustrated folder.

THE E. H. WACHS COMPANY

Manufacturers of Engines, Valves and Machinery since 1883
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Locating Equipment and Personnel

The next job is to determine what equipment, supplies and skilled personnel are available. In a small community, much of this may be known to the municipal officials. In the larger communities, the construction and labor organizations can be of outstanding value. A summary of what is available, checked against estimated needs will provide a basis, first, for a review of the requirements, if these appear excessive in the light of what is at hand; and, second, for determining needs for purchase, stockpiling and mutual aid arrangements.

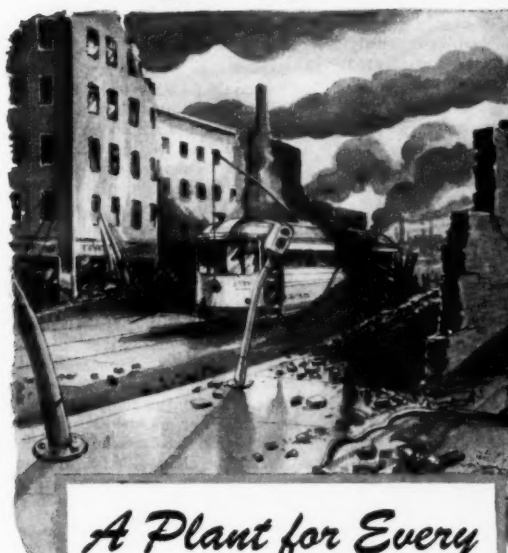
Many of the jobs to be done in civil defense will not be markedly different from the jobs done in civil life, and every effort should be made to utilize men in the kinds of work in which they are already skilled; or, at least, in work of a generally similar nature which requires the use of equipment and materials with which they are familiar. Some jobs, however, may be unlike any that occur in civilian life, and special training may be required in such cases. By means of the unit system already outlined, the need for special training and the type of training necessary will be apparent quite quickly and can be planned for and provided. Usually this can best be done through the team captain or foreman.

In case of a major catastrophe, key personnel may be injured, killed or unable to reach their posts, or to communicate with headquarters. While 2-way radio communication for all important personnel should be provided whenever possible, this should be supplemented with a high degree of decentralization. Team foremen and captains, and area or job supervisors should have clear directives

- Minimum Pipe Line down time.
- Cuts under water in flooded ditches.
- No broken pipe, milled cut.
- Thor Air-Powered, no flames near pipe.
- Set-up time about 15 minutes.
- Portable — weighs only 265 lbs. Two men can carry and set up unit.
- Small excavation — only 16" clearance needed.
- One machine cuts all pipe sizes from 10" to 48".
- Only two adjustments necessary to change sizes.

In time of disaster...

Emergency Electric Power is VITAL!



Police and Fire Radio

Emergency Feeding Centers

Air Raid Shelters

Sewer and Water Systems

Floodlighting Disaster Areas

Civil Defense Centers

A Plant for Every Emergency Need!



PORTABLE

Lightweight Onan Electric Plants are available with carrying handles or mounted on two-wheel dollies, for easy portability. Single-cylinder plants from 400 to 1500 watts. Two-cylinder, air-cooled plants to 5,000 watts.



MOBILE

Truck or trailer-mounted units from 5,000 watts and up can be rushed from place to place as required by the emergency. Electric Plants of this size can supply power for telephone exchanges, emergency feeding and housing centers, police stations and fire halls.



STATIONARY

Where emergency electric power must be available instantly, such as in a hospital or radio station, permanent standby installations are recommended. Onan Electric Plants from 1,000 to 35,000 watts can be equipped with automatic start and stop controls. These high-capacity units are powered by heavy-duty, water-cooled engines.

ONAN Electric Plants Supply Standby Electric Power for Civilian Defense Corps

Central station power is almost certain to be a casualty during bombing raids or natural disasters.

Without electric power and light, the ability of a city defense and disaster organization to cope with a catastrophe drops dangerously.

But power for essential uses is always instantly available when Onan Electric Plants are stationed at strategic points throughout the city. Onan self-contained units, mounted on trucks or trailers can be rushed to any point where power is needed. They are an important link in a city's first line of defense against disasters of any kind.

Write for Folder



D. W. ONAN & SONS INC.

7652 University Avenue

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covering what they are to do, whether supervision is immediately available or not; except that a portion of the units should always be held in reserve to await special instructions. Alternates should be designated for each key man, and the alternate and the principal should live in areas so far apart from each other that the same disaster would not be likely to affect both. Equipment should also be dispersed, and assignments for disaster duty should recognize the possibility of initial loss of some equipment.

Since records are essential for the proper performance of some phases of the work—for instance, turning off water works valves—special attention should be given to decentralization of records through the provision of duplicate copies stored in various places. Key personnel in charge of such work may need to be furnished with personal copies of some records. Micro-filming of essential municipal records and provision for safe storage should be considered, but easily readable copies must be furnished disaster repair personnel. More

information on the general subject of duplication and storage of records is given under the section on water supply; but these represent only a small fraction of the essential records of a community. The same general principles should apply to all of the essential records of any municipality.

Toledo Civil Defense

(Continued from page 67)

importance to save every building which could be salvaged.

Insofar as utilities were concerned the stricken area would be isolated. First of all, special crews would go into action to restore water service. Electricity would follow later. There would be little damage to the sewage system, and there would be no need for fuel gas.

Cross-River Communications

Cross-river communication represents another great possible problem. The Maumee River divides Toledo into two sections. On the east side are 60,000 people and heavy industrial concentrations, including the main power generating plant of the Toledo Edison Company. On the west side we have 240,000 people, several huge industrial plants and main railroad lines. We have four bridges within the city limits.

Of these four, the two middle ones, the Cherry Street and High Level bridges, are modern and in excellent condition. The north-end bridge is in a fair condition. The south-end bridge is old and not suitable for heavy traffic.

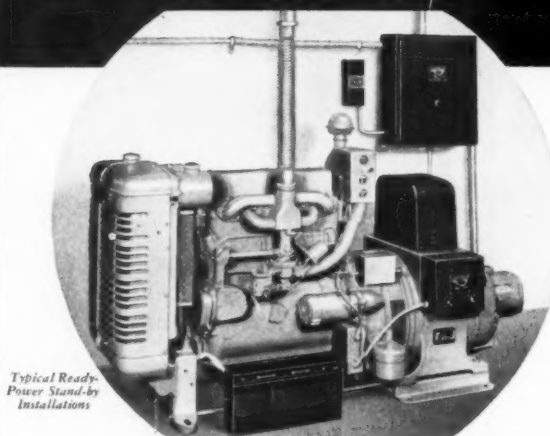
The bridges are so spaced that not more than two of them could be knocked out by a single atom bomb. It would hardly be possible to destroy both of our middle bridges by one bomb. Accordingly, even a river front attack would not completely sever the two sections of the city. So the immediate implementation of prearranged traffic control plans would partly solve the problem of maintaining communication between the two parts of the city.

Seven miles south there is a modern concrete bridge, connecting the villages of Maumee and Perrysburg. A substantial part of cross-river traffic could be diverted to that point. We also have a number of tugs and other vessels which could be pressed into service as cross-river ferries.

We also are considering the emergency installation of a two-lane sectional floating bridge. We believe

EMERGENCY POWER FOR CIVIL DEFENSE

READY-POWER STAND-BY ENGINE GENERATORS



Typical Ready-Power Stand-by Installations

PROVIDE DEPENDABLE ELECTRIC POWER INSTANTLY... WHEN WIRED POWER FAILS

Ready-Power automatic Stand-by Engine Generator installations assure electric power for the continuation of vital services during emergencies. Dependable, closely-regulated power is produced instantly upon disruption of normal wired power, and continues until normal service is resumed. Installations are compact and complete with all necessary controls. Ready-Power Engine Generators are backed by more than a quarter of a century of experience and, today, thousands of military and civilian installations are in operation all over the world.

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The READY-POWER Co. 11231 FREUD AVE.
DETROIT 14, MICH.

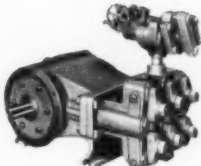
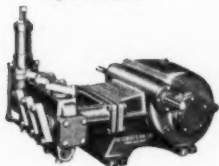
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Don't Stop at Less Than Adequate Defense!

Even though your community is located in one of the so-called "safe areas," the strongest possible Civil Defense organization is no less essential. First, because every citizen can be seriously affected by an enemy attack on a key center. Second, because every community outside a "target area" must be ready to aid those who might be bombed. Many public works officials have long standardized on Myers equipment for fire protection and sanitation purposes—and will attest to their dependability under hardest service. This record for reliability is an important point to remember, when planning your local defense program. Mail coupon today for further information on equipment shown here.

MYERS FOG FIRE PUMPS and GUNS

Fire follows in the wake of a bombing attack—hundreds of simultaneous blazes. "Fog" provided by Myers High-Pressure Fire Pumps quickly controls stubborn fires that often cannot be handled with conventional equipment. Most effective control is assured by teaming up these powerful pumps with Myers "Silver Spray" Fog Fire Guns.



Myers "Bulldozer" High-Pressure Fire Pumps are precision-built; self-oiling; fully enclosed and protected against wear. Proved unequalled for reliability under steady severe service. Capacities: 60, 40, 20 and 15 gpm. Pressures to 800 lbs.

Myers "Silver Spray" Fog Fire Guns feature speedier, easier, single-control operation. All parts non-corrosive. Guns for long-distance fire fighting also available. All models adaptable for handling various capacities. Capacities: 3½ to 27 gpm. Pressures: 400 to 800 lbs.



MYERS POWER SPRAYERS FOR EFFECTIVE INSECT CONTROL



Broken water mains and sewer pipes are an inevitable aftermath of an enemy air raid. Resulting pools of water provide ideal breeding places for mosquitoes and other harmful insects—pests that can fast create a deadly epidemic. Myers Power Sprayers are widely favored for use in decontamination and positive control of insect pests. And they are unequalled for ease of operation and unfailing performance.



Myers Power Sprayers combine exceptional durability, simplicity and technical efficiency. Complete range of models—2-wheel, 4-wheel and skid-mounted—power take-off and engine driven. All are equipped with famous Myers "Bulldozer" Pump. Capacities to 50 gpm. Pressures to 800 lbs.



MYERS HAND SPRAYERS

Communitywide health problems caused by an unexpected bombing call for immediate preventive measures by many people. Myers Knapsack Sprayers are highly efficient weapons for individual campaigns against mosquitoes, flies and similar pests—to supplement the work done with larger Myers Power Sprayers. Myers also builds Compressed Air Sprayers that are highly effective for many pest control jobs.



Myers Knapsack Sprayers are equipped with all-brass pump and galvanized or brass tank (4 gals. capacity). Widely recommended as the best knapsack sprayer built today.



THE F. E. MYERS & BRO. CO., Dept. T-241, Ashland, Ohio

Send free descriptive literature on:
☐ Fog Fire Pumps & Guns
☐ Power Sprayers ☐ Hand Sprayers

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we could obtain the necessary equipment from the nearest engineers' depot in two to three days, and that it could be installed in less than 48 hours.

Small damage to any of our bridges would be repaired immediately. Extensive damage would have to wait until after the emergency.

These plans would probably be inadequate. But they would be sufficient to meet the immediate problems of a large scale disaster and to enable us to survive not only the atomic bomb but its effects. Of course we also are counting on out-

side help, through the vehicle of mutual aid.

The School and Plant Programs

At the time of my appointment as civil defense director, I announced that an adequate civil defense program for our schools would be a primary objective. That was at the end of last December and the program is well under way. It calls for the instruction of all high school students in first aid. By the middle of February we had a sufficient number of instructors trained to implement this program.

PUBLIC WORKS for April, 1951

Secondly, it provides for the instruction of all pupils in the principles of survival under atomic attack. Third, all school buildings have been inspected to determine the best shelter areas in each. Through drills the children will become familiar with these areas. Provisions also have been made for first aid stations and equipment in the schools, and a complete system of communication.

Toledo is a large industrial center. Plant protection is necessarily an important part of the overall civil defense program. Detailed plans are now being prepared by a committee, representing both management and labor.

In drafting the plans, the major emphasis is placed on the saving of personnel. Plant and plant equipment are secondary. And we imagine a stricken plant as a sinking boat in the middle of the ocean. There is help coming in from all sides, but it requires some time for the assistance to reach it, and that small period of time determines whether many of the wounded would live or die. Each plant must be prepared to survive through its own efforts pending the arrival of the regular civil defense forces. Accordingly, the plans will provide for a complete organization in each plant. In small plants, one employee may have two or more functions assigned to him, but each must be performed so that he and the other employees may survive.

Sanitary Engineering

(Continued from page 70)

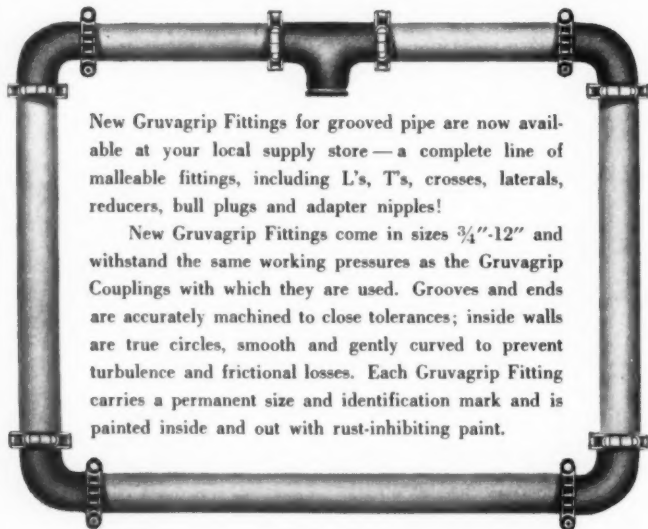
made as to denial or restriction of use. Decontamination, destruction or restoration to normal use will follow. Various departments will participate in this problem. Restrictions in the use of a street or building will be a police problem; decision as to whether or not a facility will be utilized at some calculated risk will be a political or command decision; decontamination must be by some department which has the manpower, facilities and knowledge to conduct such an operation.

The illustrated examples cited are but a few of those that may be encountered. The brevity with which they have been discussed may indicate over-simplification. No greater mistake could be made than to assume that they are simple and can be solved by anyone. The realist will provide for every conceivable obstacle in his planning

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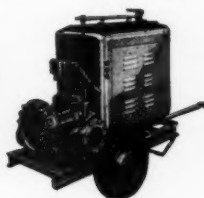
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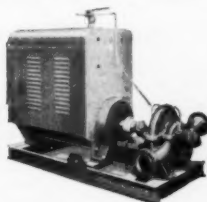
MODEL 5405
H. P. PUMP



MODEL 5404
H. P. PUMP



MODEL 5507
H. P. PUMP



MODEL 5" FIG. 701
H. P. PUMP



MIDGET 1½"
LIGHTWEIGHT

and in the execution of test exercises or drills. This approach will reveal that some of these situations are difficult, but none is insurmountable if the skills and contributions of every department are utilized.

Water Supplies

(Continued from page 73)

and the need for additional valves. From this study, a plan for making such improvements as are practicable should be developed.

Cooperation With Industries and Utilities

Where there is an industry engaged on contracts relating to national defense, a study should be made of the adequacy of the water supply furnished to it, of the fire protection afforded by existing facilities, and of the distribution network supplying the industry. In general, the same factors should be considered, in regard to important industries, as are given in the preceding paragraph in respect to municipal fire protection.

Close cooperation should be maintained with utilities, particularly in

respect to the availability of power and of special equipment for emergency use, as motors and welding equipment. The problem of supplying power to water pumps should be studied jointly. Unless there is sound assurance of power continuity, water works now solely dependent upon electrical power should make provision for auxiliary power, as gasoline or diesel engines.

Precautions Against Sabotage

(This section and the following one were prepared by the Editor of PUBLIC WORKS.)

A first step in protection against sabotage is a careful check of water department personnel especially recent employees. In small communities, where the background of every man is known for his entire life, this is far less important than in large places where often little data exist on many of the employees. If done at all, such a check should be careful and complete enough to verify statements made on applications for employment. It is better to have this done by professionals, that is, police department personnel.

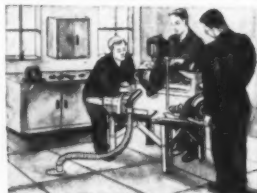
A second step should be a careful survey of the entire water sys-

tem to determine and catalog the points in it which are sensitive to damage. In listing these, differentiation should be made as to the seriousness of the damage that could be inflicted on the system. Blowing up of a water main bringing water to the community ordinarily should not be considered seriously damage, for it could be repaired in two or three days, during which time local storage should suffice. There might, however, be situations where such damage would be serious. The local water works engineer can best determine this.

Protection of really important parts of the system can be accomplished by guards, fences and lights. Guarding for 24 hours a day is costly and requires a good deal of manpower. Adequate fencing, with lights and an electric alarm system is often adequate, especially when supplemented by patrolling with a mobile unit available to answer alarms. This matter should be discussed, and decided on jointly, with police personnel.

Consideration may also be given to duplication of facilities. Where this involves much construction, as in providing a duplicate pipe line, for instance, it will rarely be de-

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sirable unless the duplicate line is needed anyway to provide adequate service. Duplication of power source, already considered in the discussion on power facilities, may be desirable; and having one or more duplicate pumps available, even worn ones, or ones that will not operate efficiently under the load necessary, is especially desirable. Provision should be made for gasoline engine power for such pumps. This arrangement will often provide a duplicate pumping station, low in cost, which can be put into service quickly in case of need.

The purification processes are often considered the most tempting target for a saboteur. In a well-designed and well operated plant this should not be the case. The normal processes of treatment will remove or neutralize most of the dangerous elements that can be added to the water, assuming that the plant is carefully operated and that certain tests are performed regularly, as described under the section on biological warfare.

Chlorination remains one of the most valuable adjuncts to any water quality protection program. The maintenance of an adequate chlorine residual is a continuing safeguard

against infection or contamination, whether chance or intentional. Chlorination devices should be provided in duplicate.

When ground water is drawn from deep wells and pumped to elevated reservoirs, there is small chance for large-scale effective sabotage that will disable the supply for any appreciable period of time.

Anti-Biological and Chemical Warfare

This term is intended to include contamination of the water by biological, chemical or radiological agents.

In biological warfare, it is considered that disease causing bacteria may be added to the source of supply or to the distribution system after the water has been treated. Though it is not believed that either procedure could be effective on a large scale, it is probable that some disease would result from a determined attempt.

Bacteria or similar organisms added to the supply ahead of the treatment plant will be almost completely removed by coagulation, settling and filtration, and following chlorination. Spore type organisms will not pass through properly con-

structed and operated filters. Organisms that will pass through filters are destroyed by chlorination.

In the case of deep well supplies, this type of attack is not a problem.

If bacteria are added to the finished water after it leaves the treatment plant, the chlorine residual in the water is the principal defense. In the case of a massive dose of contamination, it is unlikely that the residual could accomplish a complete kill, but there is little doubt but that infection would be localized by presence of an adequate free available residual. It is believed that by contamination of the water in this manner, some cases of disease would be likely to result, even with an adequate residual, but that no epidemic would occur.

Poisons could be used in the same manner as described above for bacterial contamination. The amount required to infect a supply would be large. Few of the more virulent poisons are available in the quantities required for effective use—certainly these poisons could not be obtained in such quantities without arousing suspicion and inciting investigations during any period of national or international tension.

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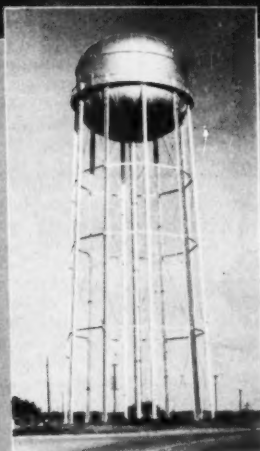
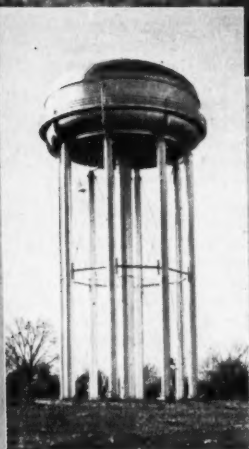


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Again, ground water supplies are difficult to contaminate; and the normal treatment processes applied to surface waters — coagulation, settling and filtration, especially when activated carbon is also used — materially reduce the concentrations of any poisons in the raw water. Chlorination oxidizes many poisons, reducing their potency.

The ph concentration is a sensitive indicator of the presence of many poisons. Chlorine demand is another valuable indicator. Both react to the presence of warfare gases. These two tests should be

run regularly as a routine precaution. Some poisons, and also warfare gases, interfere with or modify the coagulation process, so that any sudden change in floc formation time or requirements should be investigated.

Warfare gases of the sulfur and nitrogen mustard and Lewisite or arsenic types are removable by use of activated carbon, coagulation and settling, unless in heavy concentrations. In all such cases where appreciable contamination occurs, a serious effort should be made to obtain, at least temporarily, another

PUBLIC WORKS for April, 1951

source of supply. Hydrolysis, settling and oxidation will usually reduce the concentration within a few days sufficiently so that by careful drawing of water a reservoir can be used. Concentrations up to 10 to 20 ppm can be reduced by treatment as indicated above, using plenty of activated carbon. For a concentration of 10 ppm, 250 pounds of warfare gases would have to be applied to a 3 mg reservoir. Some activated carbons are much more effective than others in such treatment. Nuchar C-115 is one of a very effective group.

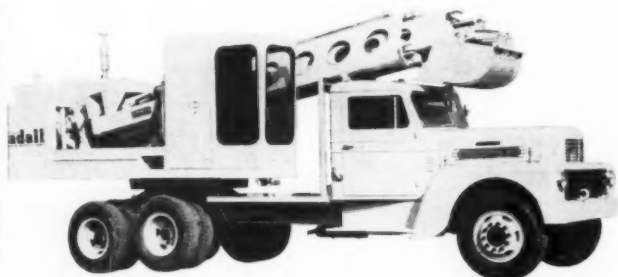
Atomic bombing will probably not affect the quality of a water supply to any serious extent. The water itself does not become radioactive—only the mineral matter suspended in it. A direct atomic bomb burst in a large reservoir would make the water unfit or dangerous to use for a few days only. The most dangerous condition would result from an underwater blast in salt water, with the creation of mist or cloud of highly radioactive salt water which would deposit in the reservoir. Since sea water contains about 3% solids it picks up considerable radioactivity. However, even under these conditions, the reservoir water would be usable in a few days.

If the reservoir water were high in calcium and magnesium compounds, it might pick up an undesirable amount of radioactivity. Treatment plant processes would normally remove such materials and render the water fit for use. This type of contamination is believed unlikely. If it should occur, care should be taken in the disposal of the sludge from the plant if tests indicated it contained dangerous radioactivity.

Traffic Control

(Continued from page 76)

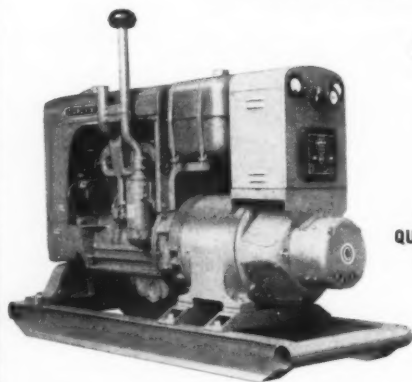
result from panic flight than from remaining in the area. Only those who are injured, sick and homeless should be evacuated. If, after a bombing, the individual still has a reasonable amount of shelter, heat, water and sanitary facilities he is much better off at home. Uncontrolled flight will end on highways clogged with disabled and gasless cars. There would be no food, no water, no sanitary facilities and no method of getting the multitudes, the thousands upon thousands of stranded men, women and children to shelter of some kind. The most



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SPECIFICATIONS

Shovel reach below ground surface..... 8 feet
Digger reach behind tractor..... 10 feet
Swinging arc..... 140°
Trench width, standard digging shovel, single cut.. 18 inches
Digging shovel capacity..... 3.5 cu. feet
Loading shovel capacity..... 5 cu. feet
Loading clearance, digging shovel, loaded..... 7 feet
Loading clearance, loading shovel..... 10 feet

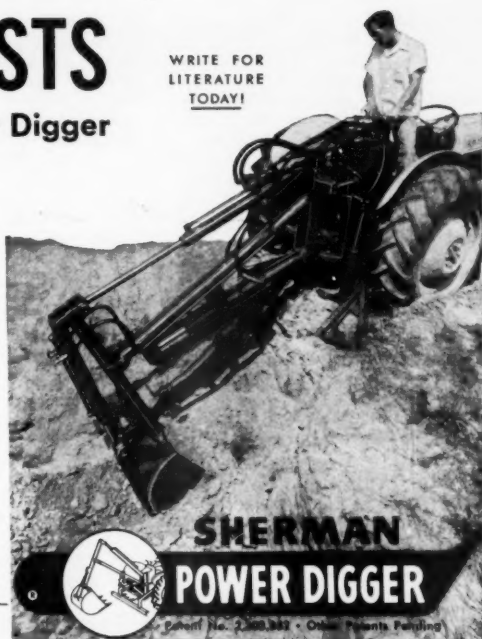
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serious result of such flight would, of course, be the prevention of aid moving into the stricken area. The loss of life resulting from uncontrolled panic and flight could be greater than that caused by the bombing itself.

A thorough educational program is therefore of primary importance. This alone, however, is not enough. Not everyone will listen to or be persuaded by an educational program. It will require some carefully planned police work to insure proper control.

Sufficient auxiliary police should

be available to cover every local area in each city. These police should get to their stations at the earliest possible moment. They should prevent unauthorized vehicles from moving or starting out. If this control is effective, the problem of panic traffic can be largely solved before it starts. However, provisions should be made at or near city lines actually to block highways and turn back unauthorized vehicles. Similar check points should be set up within the city at important feeder routes. Plans for this phase should be completed at

the earliest possible moment and put into action at the first indication of an emergency.

Another traffic generator that should be short-circuited by an educational program is that of parents who will try to rush to schools to get their children. A casual observation of the Civil Defense activities in most of the schools indicates that the children will know more about taking care of themselves than will the parents. They will be safer together, under the supervision of their teachers, than they will by being exposed unnecessarily on city streets. They will be brought home in due time and will probably fare better through the special training they receive and the special arrangements that will be made for their welfare. It is quite evident therefore that a proper Civil Defense program in every school will eventually bear fruit as an effective traffic control measure.

Traffic control thus boils down principally to education. In an emergency area any normal traffic control system will probably be out of operation. It will be necessary to depend wholly on men for its successful accomplishment. The only way that men, especially the many men that must be used, can do a job is for them to know what to do and when to do it. This means that any plan must be simple, sensible and sure. It means that practically everyone must be instructed; they must know and understand.

The regular police must know their job; the auxiliary police must know theirs; the doctor, the nurse, the rescue worker, the fireman, the construction worker, the engineer, the foreman, the thousands who come from distant places to help must know their jobs. Even more important, they must all have confidence in one another. They must be able to leave their own homes with the feeling that if something happens to their people, someone is just as ready and willing to rush in and help them. The individual in the stricken area must know what to expect and what is expected of him. He must remember that he can thoughtlessly generate traffic that will take extra men to control. This waste of manpower and time cannot be permitted. For every man wasted two may die.

Civil Defense is everybody's job. If everyone does his job, traffic control will be easy and effective; in fact all of the objectives of Civil Defense will be accomplished with a minimum of destruction and loss of life.

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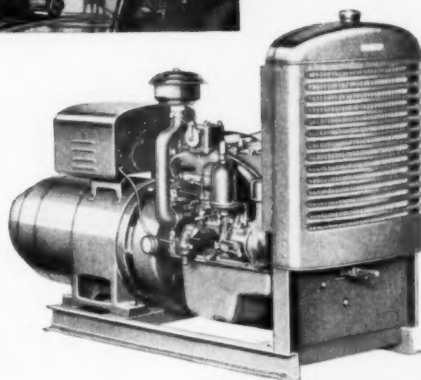
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Sewage Treatment

(Continued from page 77)

in the event that large areas were unable to utilize the sewer system and it became necessary to dispose of excrement collected in containers. In most instances, it should be possible to flush this material into a sewer located between the treatment plant and the damaged area. The Health Services would supervise these activities following an incident but during an attack its primary function may be to give

first-aid to the injured. If adequately diluted (20 to 30 gals. of water per person) night soil can be treated at the sewage plant. Pumps should be available to draw water from nearby streams or recirculate effluent to provide the required dilution.

Maintenance and Repair

The Maintenance Services are concerned with the protection of the buildings and equipment. Following an attack, the maintenance services must make a survey of the plant to determine the extent of

PUBLIC WORKS for April, 1951

damage. Dangerous walls or foundations are shored up or demolished, debris removed, and conditions restored to normal as rapidly as possible. In addition to the equipment and tools required for an average plant, the sewage treatment plant should have several portable pumps available for use in case of flooding by broken sewage lines. Masks of the type described under Fire Services will be needed. Providing air raid shelters, illumination control, and utilities control are additional duties of the maintenance services. The air raid shelter should be located away from sewage and sludge lines so that it will not be flooded by a broken line. Adequate shelters must provide for protection against gas and radioactive materials carried in the air. Filtered air for the shelter offers considerable protection from the latter. Operation of the treatment plant under blackout conditions should be worked out by the maintenance group. To conceal the distinctive structures and open tanks of a sewage plant in daytime would require outside help and would probably require the use of smoke. During a raid, two persons are usually stationed at the various utility controls to handle emergencies at those locations, other locations are covered by a squad which has been organized and equipped for the repair work.

The civil defense program for a sewage treatment plant as outlined here should be supplemented by the manuals available from the Federal Civil Defense Administration. For example, this organization has recently released a 250 page manual entitled "Health Services and Special Weapons Defense" which presents a detailed step by step outline of the 39 major functions involved in health services and special weapons defense. Valuable manuals for the other services are also available. With an atom bomb similar in size to the ones used in Japan, there is more or less complete destruction in the vicinity of the explosion. Mortality is over 90% a quarter of a mile from the explosion but drops rapidly as the distance from the explosion increases. At a mile it reduces to 25%; and it practically vanishes at a distance of two miles. If the plant is within the critical range of $\frac{1}{4}$ to 2 miles from the atomic explosion, lives could be saved by following the suggestions of the Civil Defense Office which lists the six survival secrets for atomic attacks as follows:



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1. Try to get shielded.
2. Drop flat on ground or floor.
3. Bury your face in your arms.
4. Don't rush outside right after a bombing.
5. Don't take chances with food or water in open containers.
6. Don't start rumors.

It is important that all employees be familiar with these suggestions. The entire civil defense program of the sewage plant should be coordinated with the civil defense organization of the local community, so that in a time of emergency help could be obtained or given.

Notes on Floor Space and Facilities for Shelters

This country has had no first-hand experience in the needs for bomb shelters, whereas England had much experience in this respect during World War II. No data have as yet (March 1) been issued by Civil Defense in respect to the design standards for shelters. This article will present some English standards, with comments in the light of American conditions.

Shelters are of two types—those specially constructed for this purpose and those adapted from existing buildings. In neither case can protection be assured in case of a direct hit, even of a high-explosive bomb.

Floor space provided by English standards is 6 sq. ft. per person for small shelters—less for large ones. In the case of specially constructed shelters, the English set a limit of 50 persons in one compartment or cell. Air space should not be less than 50 cubic feet per person. Floor, wall and ceiling area combined should total at least 25 sq. ft. per person. This requirement will usually govern floor space per person. For instance, a room 20 ft. by 15 ft., with the ceiling 8 ft. high, will accommodate 50 persons on the basis of 6 sq. ft. of floor space per person; 48 persons on the basis of 50 cubic feet of air space per person; but only 46 persons on the basis of 25 sq. ft. of floor, wall and ceiling space per person.

English experience indicated the need for one closet seat for each 25 persons "with supplementary buckets." It is believed that there should be at least one toilet for each sex for 50 persons; two for each sex from 50 to 100 persons; and for shelters serving larger numbers of people this ratio may be reduced slightly. These figures are minimum.



Construction of defense housing projects will increase the burden on municipal manpower tremendously.

The ideal way to ease the garbage collection burden is to insist, right from the start of these projects, on the installation of a food waste disposer in each new home. It's a practice that is fast gaining acceptance.



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English requirements for ventilation are 150 cu. ft. of air per person per hour for shelters 80% above ground; and 250 cubic feet per person per hour for shelters 60% above ground. These figures are based on staying in shelters not more than 3 hours. It seems doubtful if provision need to be made in this country for uninterrupted longer stays; and it seems likely that the need for shelters would not exist for 3 hours. This is a matter on which advice should be forthcoming from the Civil Defense Administration.

There are no English data on water supply requirements. On the basis of the 3-hour stay in shelters, one quart of drinking water per person should be sufficient.

The need for drainage of shelters should be considered most carefully, and necessary pumps or other arrangements provided. This problem of flooding may arise from wet ground into which the shelter is constructed, from broken water or sewer mains, or from serious storms occurring during the time the shelter is occupied.

Housing Data

When housing is to be furnished for other than very brief periods,

as when plans for evacuation are being made, 40 to 60 sq. ft. of floor space should be provided per person. The lower figure is the absolute minimum for all but emergency overnight use. Usually double-decking of beds, or extremely close spacing will be necessary if only 40 sq. ft. per person are to be provided. For housing occupancy, toilets should be provided for not less than 5% of the number of people housed; if sufficient flush toilets are not available and cannot be installed, either outside pit toilets should be provided or indoor or outdoor bucket or pail toilets. From 2 to 5 gallons of water should be furnished per person, exclusive of laundry requirements. Ventilation needs will depend somewhat on weather and temperature conditions, but 500 cubic feet of air space should be the minimum; and 600 cu. ft. or more is very desirable. In dormitories, head-to-foot sleeping, Army style, should be considered.

Asphalt Softener Permits Reworking Old Pavement

A California pavement, laid in 1936, with 50-60 penetration asphalt, and which had begun to break up, was reconstructed. The old pave-

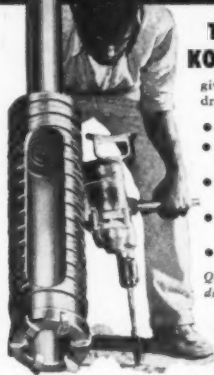
ment was broken to a depth of 8½ ins. by a Caterpillar tractor and LeTourneau roofer. A grid roller, loaded to 28,000 pounds was used to break the large chunks, with final breaking by an Athey loader and portable breaker.

The asphalt softener, which is produced by Shell Oil Co., was applied to the broken material with a Gardner mixer. Tests showed 6½ to 7% of 25 penetration asphalt and 11 to 12% material passing 200 mesh. In accordance with the manufacturer's recommendations, 1.35% of the softener was applied. This appeared to be too much and was reduced to 0.8 to 0.9%.

Reworking of the old material, with the addition of 33% of 5 16 by No. 8 screenings produced an excellent surface, which has given good service. The project worked on was a small one; there was much delay in use of equipment. However, final costs amounted to only \$4.62 per ton of mixture. It is believed that these costs can be materially reduced and that salvage of old bituminous pavements, utilizing the bitumen already in them, is practical and economical. No seal coat was necessary, though it had been intended to lay one.

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Machines Clean Sewers Clean and Fast

Don Wessel
Water Sup't., Moberg, S. D.

OUR sewer cleaning program last year was necessary because of the sand and mud in our sanitary sewers which had accumulated over a period of 25 years. We have had a program of flushing our sewers twice a year, but all the time we were just moving the sand and mud a little farther down the line. As a result, our main sewer line, which is 15-inch on the upper end, was over half full and we had troubles from backing up in basements. This led to liability for a law suit, but thanks to the cooperation of the Turbine Sewer Machine Co. we got a set of power winches delivered on the job within a week after ordering.

We set up one machine over each manhole, these being 366 ft. apart, and threaded the cable through the sewer by means of Flexible sewer rods. We used a 12-inch bucket in a 14-inch main. It took us three days to clean this 366 ft. and we took out over two tons of sand and mud from this one section.

It took three men three days to do the work. The machine used 5 gallons of gas per day, so that the total cost, exclusive of overhead, for cleaning this 366 ft. of main, was \$59.40. We have two Turco maxi-power winches, with Briggs & Stratton engines; 1,000 feet of $\frac{3}{8}$ -inch cable; and 500 ft. of $\frac{1}{4}$ -inch cable. All of this equipment is mounted on a rubber-tired 3-wheel trailer.

Heating Bridge Decks and Pavements

G. S. Paxson, Bridge Engineer,
Oregon State Highway Commission

THIS paper, which was presented at a Highway Research Board meeting, describes a pavement heating project using water from a well driven into a subsurface strata carrying hot water; and also the design of a project involving heating a bridge deck by electricity.

Because of topographic reasons, a section of 4-lane roadway, including two spans of a bridge was built on an 8% grade at Klamath Falls, Ore. To minimize the traffic hazard from frost and snow, the roadway was heated. The project is underlaid by a strata carrying natural hot water so a 12-inch well was drilled 425 ft. deep to reach this

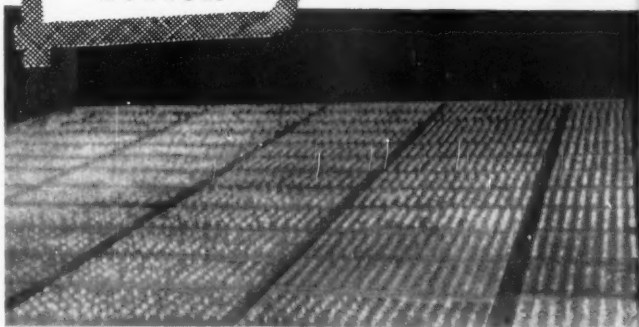
strata. The water temperature is about 180°F and the water contains mineral salts in solution. To guard against deposits in the pipes a heat exchanger was placed in the well and an unmineralized solution circulated through the pavement slabs. The circulating system consists of 0.75-in. wrought-iron pipes at 18-in. centers placed at mid-depth of the slabs.

The system was designed to melt 0.5-in. of snow or 2.6 lb. of ice per sq. ft. per hr. This required 37.4 BTU per sq. ft. per hr. The design was based on a flow of 116 gal. per

hr. per 30-ft. length of pavement slab, entering at 160 deg. F. and leaving at 70 deg. F. In actual operation the fluid entered at 130 deg. and left at 65 deg. The change in initial temperature was compensated for by increasing the flow to 158 gal. per hr. The actual BTU per hr. per sq. ft. varied from 43 to 47.

The installation operated through the winter of 1949-50, which was the most severe on record. With snow falling at the rate of one-half inch per hr., the pavement surface was moist but clear, with a surface temperature of 37 deg. F. and air

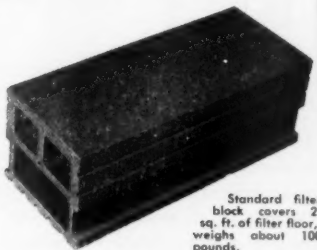
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temperature of 32 deg. F. A storm with a snowfall of 6 in. in 5 hr. left 0.5 in. of soft slush on the pavement, which was cleared in 30 min. At no time did any ice form. Tests indicate that after the pavement and subsoil reach equilibrium temperature little if any heat is lost into the subsoil. In fact the heat stored in the subsoil helps to maintain the pavement heat during periods when the system is working to capacity.

Heating a Bridge Deck

Limited distance in which to rise from street level and overcross a

railroad forced the use of a 7% grade on the approach to a bridge over the Willamette River at Salem, Oregon. Heavy snowfall is infrequent in the Willamette Valley, but high humidity results in frequent frost. As a safety measure the concrete deck of the approach will be heated. Electric heat will be used. A series of laboratory tests has been run to determine the power requirements.

The bridge deck will be a reinforced concrete slab supported by concrete girders. On top of this deck a 2- by 2-in., 14-gauge, gal-

vanized iron wire mesh will be laid, forming the heating elements. This will be covered with 1½ in. of plant-mix asphaltic concrete. The delivery of heat will be regulated by the voltage supplied to the grid. An experimental concrete slab 6 in. thick, 20 in. wide, and 6 ft. long, with wire-mesh heating element and asphaltic-concrete topping was prepared. This was tested in a cold room in which zero F. temperature could be maintained.

Tests were run to determine the temperature at bottom, center and top of the concrete slab, of the heating element itself, and at the top of the asphaltic surfacing at a range of air temperatures and varying power input. The placing of a 3½-in. rock-wool insulation on the lower surface was found to give a great increase in efficiency. Circulation of air simulating a wind greatly increased the power needed. Power at the rate of 15 watts per square foot of surface will be supplied with switching arrangements whereby the total normal power can be concentrated in the wheel tracks in each traffic lane during unusually cold weather. It is expected that pavement surface temperatures can be kept about 15 deg. F. above air temperatures under normal weather conditions.

Water Improvements at Levelland

The water supply of Levelland, Tex., comes from six wells. Pumping equipment consists of six 500-gpm electrically driven low-lift units; two 500-gpm and two 750-gpm electrically driven high-lift pumps; and a 750-gpm tractor driven standby. Daily consumption by the 8,500 population average 1.75 mgd. Storage capacity has recently been increased about six times by construction of a Chicago Bridge & Iron 400,000-gal. elevated tank. Joe E. Ward, Wichita Falls, Tex., is consulting engineer and Ray A. Drain is City Manager.

Oregon Approves Fluoridation

In Oregon the state board of health has given its approval to a statewide program of fluoridation of public drinking water supplies. Only cities with adequate water treatment plants meeting state board of health standards will be permitted to add to their water systems the substance which slows tooth decay. It is estimated that the cost will range from 2½ cents to 15 cents per person per year.—Public Management.



After a bomb strikes, dangerous elements are left in the air to drift and spread with the wind. Accurate knowledge of wind and weather conditions are vital to the proper handling of people to be evacuated from areas already contaminated or liable to become so because of wind direction and velocity.

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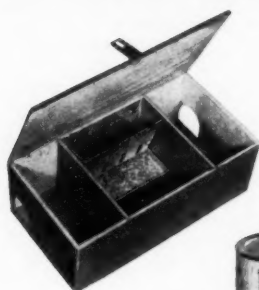
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Reducing Traffic Interference from Excavations

This is a portion of a paper by H. H. Cox, Los Angeles Department of Water and Power, presented at the Second California Institute on Street and Highway Problems.

BARRICADES and warning devices are necessary when excavations are being made in a public street or highway in order to provide protection to both the workers on the job and the general public. These protective devices should be so situated as to keep traffic interference to a minimum. Proper placing of the barricades ahead of the job and in line with traffic flow should be a prime consideration in the planning of each job. Likewise, barricades and warning devices should be rearranged promptly as work progresses.

Spoil Bank

The storing of excavated materials is most important. Dirt and other materials not only are a potential hazard in wet weather but also may add to traffic interference. Spoil-

bank materials can be kept from spreading by the use of toe boards or bins, which may be adjacent to the excavation or may be placed behind the curb where conditions warrant. Excess materials or surplus spoils which will not be used in completing the job should be hauled away immediately.

At excavations in an intersection, it may be preferable to haul away all material occasioned by the excavation and to return the required amount of backfill when needed rather than to block the intersection by spoil piles for the entire duration of the job.

When necessary to excavate in the outer traffic lane from the curb, excavated material should be confined to the area of the outer lane and stored in bins in that area so as not to block the traffic lane near the curb. In this case, the use of toe boards and guard rails on the traffic side of the trench is essential.

When an excavation is near the

PUBLIC WORKS for April, 1951

curb, a spoil box should be made in back of the curb with proper toe boards and railing to protect and confine such material and prevent hazard to pedestrians using the sidewalk area.

Use of Steel Plates

Steel plates held firmly in place over an open excavation permit practically unimpaired traffic flow. Such steel plates properly placed are of great value at street intersections, on major traffic arteries, and for driveway entrances, particularly after work has been stopped. Steel plates at intersections frequently permit the continuation of not only two-way but also four-way traffic over the excavated area.

When manhole cover plates are removed, a major traffic interference may be created if work equipment and warning devices are not properly arranged. Whenever a manhole cover is removed, protection of the area is necessary and the proper routing of traffic is usually extremely important, primarily because manholes are often located near the center of traffic lanes in the highway.

Careful consideration must be given to the placing of such equip-

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ment as digging machines, compressor trucks, pumps and mixers. Essential equipment should be so placed on the highway, whether in immediate use or while temporarily idle, that unnecessary interference to traffic will not occur. Equipment which is used intermittently and which adds considerably to traffic interference when in use may have to be removed when not actually working and returned again when needed.

The thoughtless parking of cars by supervisors and department heads in their anxiety to be on the job, whether for job direction or for project inspection, often creates or adds to the traffic interference problem. Parking-lot parking is an inexpensive way of avoiding this at the cost of a few parking fees.

A public utility should not only recognize the authority of city, county and state police agencies for the efficient movement of traffic, but should also adopt a definite policy of cooperation. Public-relations programs can be strengthened by this form of cooperation, and an understanding of the public utility's problems by local police authorities can be of tremendous aid.

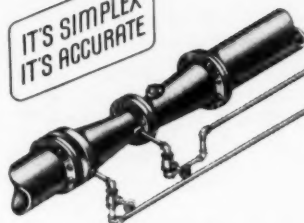
Nitrate Pollution in Drinking Water

Nitrate analyses are routinely made on all water samples coming to the Water Pollution Control Laboratory of the Georgia Department of Public Health, according to the excellent report on water pollution control forwarded us by W. H. Weir, Director of Water Pollution Control. Data are being accumulated in the laboratory regarding the nitrate content of Georgia waters, with particular reference to fluctuation of the nitrate content. While data are not yet available to draw definite conclusions, it appears that deep well waters that are nitrate free at any time tend to remain nitrate free.

In well waters containing nitrates, variations of as much as 400% in the nitrate nitrogen content in the same well have been recorded. Fluctuations appear to be related to rainfall, with perhaps some seasonal factor.

Some administrative difficulties have had to be overcome in connection with the nitrate sampling program, as the well owner or tenant tends to confuse bacteriological examination and nitrate analyses. When special samples are taken for nitrate analyses, a thorough explanation is given the owner.

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This meter is built with maximum differentials of 114" or 64" of water to measure over ranges of 13 to 1 and 10 to 1 respectively. Standard design includes indicating, recording and totalizing features but, if desired, it may be furnished with various combinations of these elements.

Versatility of installation is attained through its various forms of mountings and its adaptability to different pressure conditions, particularly those of low pressure.

This instrument is one which may be recommended without hesitation whenever accuracy and long range of measurement are required.



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PUBLIC WORKS

DIGESTS

THIS section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

WATER WORKS . . .	107
HIGHWAYS AND AIRPORTS . .	116
SEWERAGE AND REFUSE . .	122

THE WATER WORKS DIGEST

Inclined Reservoir Intake

What is believed to be the first inclined intake for a reservoir is included in the construction of a 1,610,000 cu. ft. earth-fill dam by the San Jose, Calif. Water Works. Instead of building a customary vertical inlet tower, what amounted to the same thing was laid in a trench in the inner slope of the dam, at an angle about 33° with the horizontal. It consists of 250 ft. of 52" steel pipe encased in a minimum of 12" of reinforced concrete and lined with 3/4" of cement mortar. Eight inlets are provided at elevations ranging from 48 ft. to 148 ft. above the bottom; each provided with a 12" valve operated hydraulically from a control system at the top. This intake discharges at its foot into an outlet conduit 1100 ft. long which passes under the dam. This construction eliminated the customary bridge from top of embankment to vertical tower and lessened the construction cost.

N. J. Kendall—"Inclined Inlet for Reservoir;" *Engineering News-Record*.

A Flexible Filtration Plant

Chester, Ill., population 7,500, in 1946 found it necessary to move its filtration plant to a new location and increase its capacity, and the opportunity was utilized to redesign the plant. Because the turbidity of the raw water varied from 300 to 4,000 ppm and because of the nature of this turbidity, 80% at times being in colloidal form, the plant was made unusually flexible. It pro-

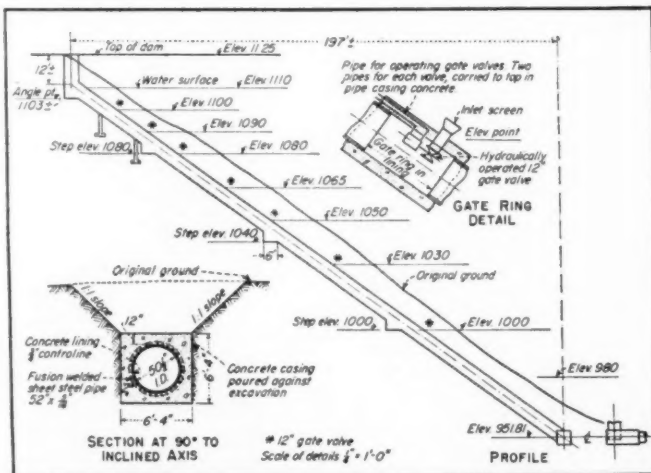
vides for series operation, using the presedimentation basin to remove some of the turbidity without use of chemicals; or by adding lime in the presedimentation basin for aiding preliminary sedimentation or for softening. Or the presedimentation basin can be by-passed and the raw water flow directly to the final clarifying and softening unit. Or raw water can flow to the presedimentation basin, and lime, coagulant and activated silica be applied at the mixing chamber for complete treatment if the main clarifying and softening unit is out of service.

F. E. Wenger—"Unusual Flexibility Features Water Plant;" *PUBLIC WORKS*, March.

American Water Policy

The report of the President's Water Resources Policy Commission was published in December 1950 in three volumes. In this the commission presents at length a "water policy for the American people", classified under the general heads of Program Planning, Evaluation, Basic Data, Financing Programs, Reimbursement, Water Resources Management, Land Reclamation, Water Supply, Pollution Control, Waterway Transportation, Hydroelectric Power; Fish, Wildlife and Recreation; and Future Possibilities. It recommends that:

1. Projects now under construc-



Courtesy Engineering News-Record

- **WATER intake is inclined in rock trench above dam.**

tion should be completed as rapidly as the national emergency permits.

2. Construction should be initiated on additional projects only as they are clearly shown to be in conformity with revised and approved basin plans, or as they are required to meet the emergency.

3. The review of basin programs and the collection of necessary data should be pushed as rapidly as possible.

4. Among the new projects to be considered for initiation, first priority should be given to safeguarding present and future projects as, for example, by reducing sediment or recharging depleted ground waters, as well as to developing new regional activity, as, for example, by the production and distribution of electric power.

"A Water Policy for the American People," *Journal, American Water Works Ass'n*, February.

Collection Stations For Water Bills

The Akron, Ohio, Bureau of Water and Sewerage finds that satellite collecting stations have benefited its operations and improved customer relations. In 1949, 11.6% of the amount of service collections, or 22% of the number of bills, were paid through agents. The number of persons paying at the office has been reduced 30%. The agents charge 5 to 10¢ per bill for the service. Oklahoma City finds it desirable to use conveniently located, authorized neighborhood agencies to collect water bills. The department pays these agencies 5¢ per bill collected. It is adopting a new plan—to have the water bill act, by common consent, as a draft on the customer's bank account, where it is deposited directly by the department. In Indianapolis, in 1950, payments of water bills of 26.7% of the customers were made through 99 collection stations, which charge from 6¢ per bill to nothing, chiefly 5¢. A large food company which operates 34 stores in the city, gives this service free. In Atlanta, Ga., collection stations have been used for 20 years and there are now 22, which furnish the service without cost to either utility or customer—one small store attributes to this a \$1,500 increase in its business. These stations collect 30% of the accounts or 20% of the funds paid. At San Diego, Calif., 16 agencies receive payments of water bills and turn the receipts over to the department

daily, receiving 6.8¢ per bill paid in monthly payments.

"Bill Collection Stations in Large Cities," *Journal, American Water Works Ass'n*, February.

Bactericidal Action Of Ultrasonic Waves

Investigations have been made at Mass. Inst. of Tech. on the effects of age of culture, bacterial concentration and environmental temperature on the germicidal properties of ultrasonic (above 18,000 cycles per second) vibrations against *Esch.*

coli. These showed that younger cultures were more resistant than the older ones; that the germicidal rate is independent of the initial concentration; and that the higher the temperature, the more rapid the rate of germicidal action—complete sterility being obtainable after sonoration for 60 min. at 98° F. and almost instantaneously at 140°.

M. P. Horwood, J. P. Horton and V. A. Minch—"Factors Influencing Bactericidal Action of Ultrasonic Waves," *Journal, American Water Works Ass'n*, February.



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Unusual Flexibility Features Water Plant. By *F. E. Wenger*, Cons. Engr. March, Pp. 40-42, 86.
 How System Head Curves Solve Pump Buying Problems. By *Thomas E. Keating*, De Laval Steam Turbine Co. March, Pp. 48-50, 60.

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HOW TO INSTALL AND MAINTAIN HYDRANTS

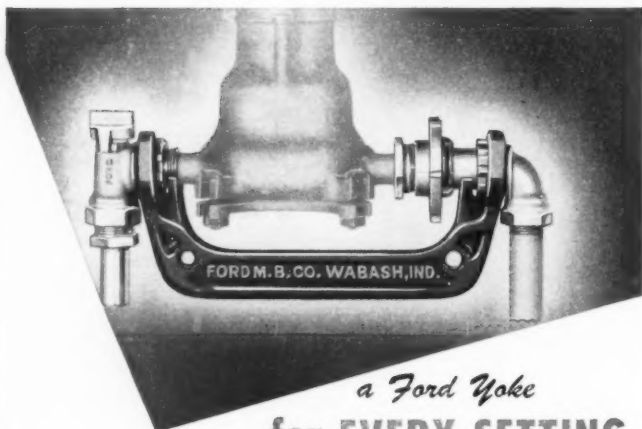
This article is based on a discussion by *Hjalmer Stalin*, Assistant Water Works Superintendent, Rockford, Ill., at the Illinois Water Plant Operators' Conference.

IN ROCKFORD we try to install our hydrants so that it will not be over one block to the nearest hydrant in case of fire. In the outlying districts where the houses are far apart, hydrants are set a little farther apart. Those set in places seldom used incur extra maintenance; they become overgrown with weeds, must be inspected each year, and often when the vacant property is built upon, they are in the way and must be moved.

We set our hydrants about eight feet from the property line, in the terrace away from the pavement so that they will be back from the street and not so easily hit by cars when accidents occur at the street intersections.

In the years previous to 1921, Rockford installed hydrants without using valves in front of them. This, it was found, was not a good practice, because whenever a hydrant had to be repaired, the water supply had to be turned off in the mains, leaving people without water. The housewives did not complain too much, but when the factories had to be without water, the complaints came in. Although there were many hydrants that had no valves even in the business districts, most of these have been corrected, so that very few are now without valves.

Originally in installing hydrants it was the practice to use the stone and straw drip beds. From a half to one yard of stone was used on hydrant drip beds, depending upon the soil where hydrant was installed.

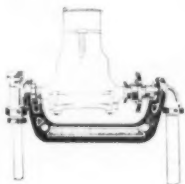


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When hydrants were used often and the ground was kept moist, the roots of trees found their way into the hydrant drip beds and filled the spaces left for drainage, thus closing the drain from the hydrant. Our records show that in some places the hydrant had to be dug up in three years. A comparison in the cost of the stone, straw and labor was made and it was found that the cost would be very little more to build manholes covering both hydrant valve and base of hydrant. Since this has been done, not much trouble has been experienced with roots, as the air space in the manhole is usually dry and will not attract the roots. These manholes are built with brick, leaving a space between each brick and not using any cement. The manhole is built up far enough so that when it is drawn in to form the neck, the manhole is in front of the hydrant. Cement is used on the upper half of the manhole. The hydrant is blocked securely. The valve on the hydrant is placed with an 18" nipple between the valve and hydrant. The manhole is built with enough space between the hydrant and the wall of the manhole to use wrenches to take the hydrant apart at the base if necessary.

Some of the old style hydrants have become so worn that they cause water hammer that has even broken mains and plumbing in homes. It was found that the hydrant valves were worn and loose on the hydrant rod. We bushed them and found that it helped some, but did not remedy the trouble. Making further tests, we found that the operating nut and the threads on the rods had become worn enough to allow play in the threads. This would let the valve give a little, so when it was almost closed it would begin to vibrate against the seat of the hydrant, causing the water hammer. We made new operating nuts and pieces with new threads and welded them on the rods, thus making a tight fit in the threads. This made the hydrant operate like new.

Testing Hydrants

Rubber valves on our hydrants were found more satisfactory because they seemed to have a little more give in case a stone or something hard got under the valve. The valve would then swell out again and heal the bruise caused by the stone. The leather valves are harder and will leak after a dent has been put in the valve face.

Testing of hydrants is done every fall and records are kept of each test. Before testing, the Fire, Street and Sewer Departments are notified. They, in turn, call us whenever they use a hydrant. If there is anything wrong the Hydrant Card is placed in a separate file and the hydrant is repaired as soon as possible. The hydrants that have a slow or "no drip" are watched very closely after the cold weather sets in. Whenever a report is received of a hydrant being used, a checkup is made and if the hydrant does not drain properly it is pumped out

and repaired. When testing hydrants, they are repacked; each hydrant is opened to make sure that it works properly, and each cap and nozzle thread is greased.

Occasionally it is found that a contractor will connect, or try to connect, on a hydrant, with the result that nozzle threads have been damaged in trying to get a connection. This has often damaged the threads so badly that when a regular hose is connected, it has blown off. We try to be very strict about the use of our hydrants. We do set construction valves and

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meters on hydrants, but when we do, we have a valve in front of the connection, so that the valve is operated, not the hydrant. We do not allow any connection to remain on a hydrant after testing date, unless the contractor makes provisions to protect it from freezing, and assumes all responsibility for damage.

In making our tests, we find hydrants that have been broken off. This happens mostly in factory districts where large trucks have to back around them. In an effort to remedy this, at least in part, guard

posts have been installed around these hydrants. A very close record is kept of hydrants out of service. The Fire Department is notified at once and every effort is made to repair the damaged hydrant as soon as possible, thus giving full protection in case of fire. We do our own repairing, such as welding and machine work, on our hydrants. If a hydrant is broken off, we bill the cost of repairs to the responsible party, and bills are usually paid. However, in cases where the guilty party is not known, the expense is borne by the Department.



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CHLORINE DIOXIDE Controls Serious Taste Problem

The following report by Dr. J. G. K. Silvey, covering a study for a taste problem at Breckenridge, Texas, has been forwarded to us by Don C. Berry, Manager, Water and Sewer Department of Breckenridge.

THE City of Breckenridge, Texas, (population near 10,000) purchased 2,500 acres of land several years ago for the construction of a reservoir. Approximately 1,100 acres of that land are now under water giving rise to Lake Daniel, which at present has an average depth of around 10 feet. The outgoing water flows through gates into a concrete tower, thence down through a tunnel under the dam and into a small stream. The stream runs through Breckenridge to the raw water intake, which is below the city and about one-half mile from the purification plant. It is the plan of the City Council to lay 20,000 feet of pipe in the near future, thereby enclosing a part of the water supply in a conduit rather than have it flow through the old stream bed to the intake.

The stream has a thick growth of various types of terrestrial vegetation, mostly Bermuda and Johnson grass with the usual patches of trees overhanging the stream. The water level of the stream varies from time to time, permitting new growths of vegetation to be inundated according to the volume of flow.

The water that is pumped from the creek to the plant is received in an earthen reservoir having a capacity of six million gallons. Water flows by gravity from this into the plant where it is treated with alum and lime, activated carbon, and passed through the filter into the clear well where it receives 1.5 ppm chlorine.

The water had had a noticeable taste and odor for a period of approximately four weeks prior to the inspection. The odor was typical of the actinomycetes belonging to the genus *Streptomyces*, and varied in intensity depending on the rate of flow, temperature, and water treatment.

We visited Breckenridge on August 14 and observed that the raw water had a threshold odor of approximately 120. The characteristic type was musty, rotten wood odor with a pungent taste, which was accentuated by the addition of

chlorine. At that time the raw water was receiving approximately 150 pounds of alum, 120 pounds of lime, and 50 pounds of activated carbon per day for approximately 750,000 gallons of water. The pH of the raw water was 8.2 and the pH of the finished water varied from 7.4 to 7.5. The threshold odor of the finished water was approximately 50 in the clear well and about 150 in the west part of Breckenridge. The residual chlorine was approximately 0.5 ppm near the purification plant and 0.1 ppm on the west side of town.

A threshold odor examination of the raw and finished water with chlorine dioxide indicated that the demand on raw water was 3 ppm, and on the finished water was about 1.2 ppm. Chlorine dioxide was introduced into the clear well. A total of 20 pounds of sodium chlorite and 8 pounds of chlorine was fed into the system over a period of 16 hours. Installation was made around 8:30 in the evening of August 14, and the feed was continued as long as the chlorite lasted. The residual of chlorine dioxide in the clear well rose to approximately 3 ppm. In the main adjacent to the purification plant the chlorine di-

oxide went to 1.5 ppm, and a residual of .08 ppm was finally obtained 12 hours later on the west side of the city. The threshold odors in the city water dropped on the east side from 50 to 3, and from 150 to 20 on the west side at the end of the period of chlorine dioxide treatment. It was thought likely that the odors and tastes would recur since there was not enough sodium chlorite available to continue feeding chlorine dioxide, and the period of time was insufficient to eradicate the main contamination and cause a permanent reduction in tastes and odors.

The City has purchased the necessary equipment and chemicals for the use of chlorine dioxide in the treatment plant and will install this equipment at an early date.

Maintaining Uniform Water Pressures

Water pressures in the Town of Tonawanda, N. Y., in the past, have varied markedly, dropping as low as 20 psi in some sections. This has been corrected by a program of construction involving installation by Chicago Bridge & Iron Co., of two 1 million gallon capacity elevated tanks. These are of the radial

cone type, with a 35-ft. range below high and low waters. These provide additional fire protection and reduce materially the former large variations in water pressure. In general, pressures in the distribution system are now maintained between 60 and 70 psi.

Plans for a Town water supply system involve a new intake, a 12-mgd pumping station and a 12-mgd filter plant. Previously the town has purchased water for its 60,000 citizens from the Western New York Water Co.

Heavy Equipment on Highway Relocation

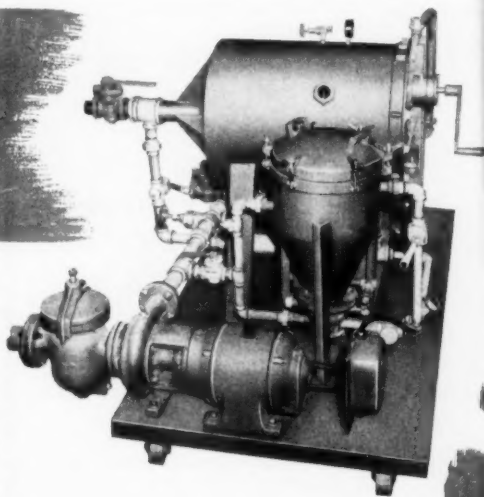
In reconstructing an 8-mile section of US 611 in Pennsylvania, 230,000 cu. yds. of Class 1 excavation and 115,000 cu. yds. of borrow will be required. Cuts run to 32 ft. deep. Most of the excavated material is red shale. Three Caterpillar DW10 diesel tractors with No. 10 scrapers were used to remove overburden from the shale before shooting. After shooting, the shale was loaded by 1½-yd. Northwest shovels into Caterpillar W10 wagons to haul to fill. Daily production runs about 2,000 cu. yds., with hauls averaging about 1,500 ft.

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Complete units, including filter, pump, slurry feeder, debris catcher, chlorinator, and gasoline engine can be furnished ready for mounting on truck or trailer bed. Filters are available with rated capacities ranging from 900 GPH to 72,000 GPH. These standard sizes, however, can deliver far greater quantities of water when necessary, although this is not recommended for general service. Write for literature.



Other units, designed for manual portability, may be supplied. Our Engineering Service is available for special design work or for modifications of standard models.

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DIATOMITE FILTERS SOLVE MUNICIPAL POOL PROBLEMS

Harry D. Smith,
Superintendent, Water Department
Olean, N. Y.

OLEAN'S municipal swimming pool is an outdoor pool, of tile and concrete construction, 120 ft. long and 50 ft. wide, with a capacity of 210,000 gals. In the spring of 1949, the city was faced with the replacement of the filters. Not only did the old equipment lack the required capacity, but after 22 years of service the underdrains and wash-water distribution system had become clogged and corroded and the sand and gravel were in such condition that replacement was necessary. The old filter was equipped with a perforated steel plate, without nozzles, for under-drainage and wash water distribution, and this was in bad condition.

Before the 1949 season opened, we installed two Bowser diatomite filters, 104 sq. ft. each, with new piping and valves; and two pumps, 450 gpm capacity against a 50-ft. head. Diatomite filters were especially appreciated because of the lack of available room in the building housing the filters. The two

pumps are arranged for automatic operation. When the filters are clean and the pressures does not exceed 50 ft., or about 21 psi, only one pump operates. After the 21-pound pressure is reached, a mercooid switch puts the second pump into operation. In this way, we are able to operate on one pump for a good portion of the time, saving about 60% of the power cost that we would have to pay with a single-pump setup to handle both filters. Also, this arrangement gives us, in effect, a stand-by pump for use in emergencies.

Filter Operations

There is a pre-coat pot for each filter, and with present operation we are using about 12 pounds of precoat per filter. The slurry feeder permits a small amount of the diatomaceous earth to be added during filtering, thus markedly lengthening filter runs. During last summer we were averaging 3-day runs at 24 hours a day with an application of 40 pounds of diatomite per day, including amounts used for pre-coating. We have tried different grades of diatomaceous earth to determine the lengths of runs obtainable, and have found Johns-Manville Hy-Flo

Supercel to serve our purpose best.

When operating the filters, we do not allow head differentials to go above 30 psi. This gives us plenty of leeway for backwashing. We use pool water and the recirculation pumps for backwash and the wash water has a free discharge into an opening with an air break.

For sterilization, we use chlorine and ammonia. The chlorine is added to the 6-inch main just ahead of the first pump and the ammonia is added just after filtration. We retain about 1 ppm residual of chloramines at the influent end of the pool and 0.7 ppm residual at the effluent end, with no complaints or ill effects on the part of the pool users. One bacteriological sample is collected each day and these have been far below the requirements of the State Department of Health.

The first summer of operation brought us a few difficulties, but these were quickly ironed out and since that time we have had wonderful operation and are very well pleased with our new filters. The condition of the water has been excellent; it stays perfectly clear and sparkling, with a bluish cast, and just to look at it gives you the urge to want to get in swimming.

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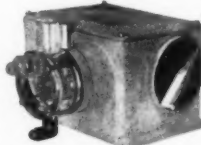
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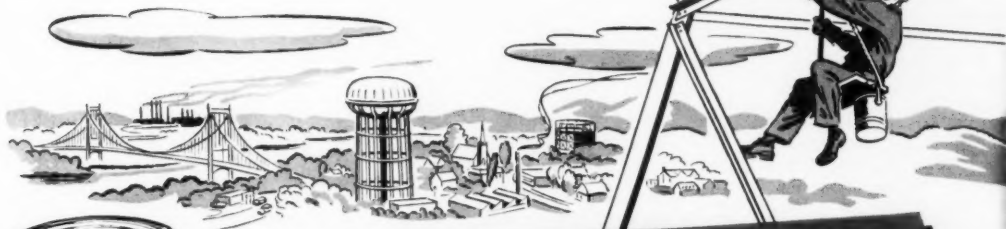
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**Hardfacing
Road Equipment**

Experience has demonstrated that the most economical method of prolonging the life of equipment, of getting the best production from it, and reducing the spare parts inventory, is systematically to hardface the cutting edges and wearing surfaces. Automatic methods of hardfacing may be most desirable for tractor idlers and rollers, and for cylindrical work or large, flat surfaces. Hardsurfacing to prolong life will perhaps pay in 1951 where it would have been uneconomical in 1950. Hardfaced tractor track rollers increase the life of the track because they do not wear it unevenly; but use of too-hard alloys tends to cause excessive wear on other parts of the track assembly. Detail instructions are given for hardfacing various parts of tractors, bulldozers, scrapers, graders, scarifiers, elevating graders, ditchers and other equipment.

"Conserve Your Equipment by Hard-Facing It Against Wear," *Roads and Streets*, February.

**One-Side Parking
Aids Street Cleaning**

To lessen the difficulty of cleaning streets caused by cars parked along the curbs, New York City has been testing the idea of permitting parking on only one side of the street, alternating the parking side on successive days. In August, 1950, a trial was made in a 90-block area where the difficulty was worst. Between 7 AM and 3 PM, no parking was permitted on the north and west sides of streets on Monday, Wednesday and Friday, or on the south and east sides on Tuesday, Thursday and Saturday. This was announced by means of 1,500 signs and newspaper publication, and 115 street-parking wardens were assigned to the district. Illegally parked cars were removed to a car pound, where they could be reclaimed by paying a \$10 towing charge and

possibly a \$15 penalty. These streets were flushed daily, and swept twice by mechanical sweepers on the free side and by hand on the other. The plan was highly successful. It has permitted reducing the number of hand sweepers from 23 to 15 plus two machine brooms. Also the movement of traffic has been improved considerably. It is proposed to extend the plan to other districts.

Henry Liebman—"One-Side Parking Aids Street Cleaning," *PUBLIC WORKS*, March.

**Precasting
Highway Bridges**

Since 1948 two different systems of precasting for highway bridge construction have been developed: (1) combining precast beams or stringers with cast-in-place floor slabs to form T-beam spans, and (2) precasting beams or stringers and floor-slab panels separately, assembling the units, and welding them together with concrete to form an integral structure. One project utilizing the former system con-

tained 170 spans of 25 ft., the stringers having a cross-section of 8" x 20" and the slabs being 6" thick. The cost was practically the same as bids for treated-timber stringers with concrete deck. At Lowell, Mass., two types of precast decks were used—for spans of 20 ft. or less, precast units of inverted U-shape were assembled to form the completed deck; for spans up to 53 ft., precast stringers with cast-in-place floor slabs.

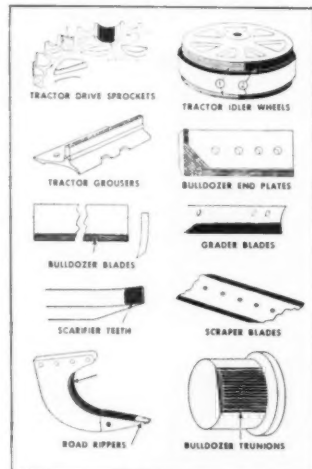
The Baker River bridge in the State of Washington is of the second type. It comprises eight 25 ft. reinforced concrete T-beams, the slabs were 8'4" x 42" by 6" thick, with thickened edges; shear-keys were provided. When all stringers and slabs had been placed and lined up, the longitudinal joints over the beams were filled with concrete, reworked just prior to initial set, and the transverse joints were filled with grout.

The following recommendations are the result of experience: Tolerances for variations in straightness, size and length should be specified. Eye-bolts or other methods of handling should be required. Use of an air-entraining agent and vibration. Consider use of lightweight aggregate. Advantages of using precast members include savings in forms and false-work; elimination of much-on-the-job labor; speed of erection; maintenance of traffic; closer control of concrete mixing, placing and curing; precasting can be done in winter or stormy weather.

R. B. McMinn—"Opportunities in Precast Bridges," *Better Roads*, February.

**Prestressed Concrete
Road at Crawley, England**

A prestressed concrete road has been laid at Crawley, England, the principles of design of which were as follows: Maximum length of slab, 400 ft. The coefficient of friction between slab and subgrade was esti-



Courtesy Roads & Streets

● **HOW** tools are **hardfaced**.

mated to lie between 0.25 and 0.50, giving a decrease in prestress for a 400 ft. length of slab between 50 and 100 lb. per sq. in.; and therefore, by using a prestress of 200 lb. there would remain at least 100 lb. per sq. in., which might not prevent cracking under load and temperature stresses, but should ensure closing of the cracks on removal of the load. The cables used for producing stress consisted of twelve 0.2" wires surrounding a 16-gauge steel wire core helix. The cables were aligned at an angle of 3 to 1 to the line of the road at approximately 7½ ft. centers. The depth of the slab was made 6", less than this giving insufficient cover to the 1½" cables at points where they cross each other. The cables were anchored in cones set in concrete haunches constructed independently of the main slab. They were placed, encased in steel tubing, before the main slabs were poured; and stressed about three weeks after pouring, using a jack at each end of each cable. The cable sheaths were then washed out and filled with neat cement grout. As it was not known how much expansion to allow for, a 5 ft. length of temporary tar macadam was placed at each end, to permit actual measuring of the expansion, and designing an expansion joint to fit. Reference points along the road permit exact measurement of slab movement, and strain gauges were concreted in the slab.

"Prestressed Concrete Road Laid at Crawley," *Municipal Engineering*, Feb. 23.

Design Data on Baltimore Airport

The site of the new \$15,000,000 Friendship airport 9 miles south of Baltimore was chosen because it is largely fog-free, has clear approaches, and the soil is suitable for construction. The 3,200 acre airport can handle 200 landings and takeoffs per day. Runways are 200 ft. wide and 6,200 to 9,450 ft. long, and are surfaced with 10-in. bituminous concrete, laid on a uniformly "super compacted" subgrade. The 10-in. pavement cost \$3 a sq. yd.; without supercompaction of the foundation a 17-in. pavement would have been required. Strips parallel to the runways were planted with a high-grade turf; other areas are seeded with a hardy African grass.

Runways are illuminated with 52,000 cp lamps spaced 200-ft. apart on each side. Controls for the lights, located in the tower, includes

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brightness adjustment from 0.3% to full intensity to reduce glare and prolong lamp life. In the terminal building, passenger traffic is on the upper level and baggage, freight and services below. A paved parking lot has room for 1400 cars.

Utilities feature long-range planning in their design and location. Electric power is brought in from two directions. At intersections between runways and taxiways empty cable ducts cross under all four sides. Similarly water pipes and telephone conduits are placed beneath these intersections and sealed

off. Pipes close to runway surfaces were protected with a soil-cement mixture before compaction of the subgrade. Sewage is discharged through a 4-mile outfall of 15-in. vitrified clay pipe to the Baltimore County system. Capacity is 1.6 mgd. Stormwater culverts under the runways are 500-ft. long, and are designed with reduced gradients at the lower end which will produce a hydraulic jump and cut down the exit velocities.

"World's Best Airport"—Baltimore's Friendship Field"; *Engineering News-Record*, Feb. 1.

Bituminous Carpets Withstand Winter

Due to the necessity for economy, England has laid a large mileage of thin asphalt and tar carpets during the past two or three years. A survey of their condition, made last February, shows that they have generally withstood last winter's freezing and snow remarkably well. This was especially true of those that had recently received a surface dressing of asphalt or tar and chips. One engineer reported that the general practice is to use tack coats of cold emulsion for surface dressing their carpets, and that this is a great help in maintaining them in good condition.

"Wintering of Road Surfaces," *Highways & Bridges*, Feb. 14.

Asphalt Mulch for Roadside Seeding

The Ohio Dept. of Highways has used mulching for protecting roadside seeding on 6 construction projects totaling 15 miles. Experience on these jobs developed several ideas, including the following: The seed bed should be loosened to a depth of at least 2", and 4" is highly desirable. After seeding and just prior to applying the asphalt, sufficient water should be applied in the form of a heavy mist. The ideal temperature of the cutback asphalt seems to be 170°-175°. It should be applied at the rate of 0.2 gal. per sq. yd. on flat areas and 0.3 gal. on slopes and ditches. From spring to Sept. 30 seems to be suitable for seeding and mulching in Ohio. The seed should be placed from 1/2" to 1" deep.

Wilbur J. Garmhausen—"Asphalt Mulch for Seeding and Protecting Roadway Areas," *Roads and Streets*, February.

Citywide Street Improvements

Following the completion of an extensive sewer system, Daytona Beach undertook a wholesale improvements of its streets. Work on about 70 miles of streets included over 40,000 lineal feet of storm sewers, ranging from 15-in. to 42-in. with long storm water inlets on most of the corner curbs; high-type pavement on six blocks of the business district; resurfacing 37 miles of bumpy pavement, generally on a leveling layer; widening and rebuilding a number of residential streets; more than 23 miles of new pavement on lightly traveled residential streets, consisting of a sheet

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asphalt wearing surface on a 7-in. stabilized base; several new streets, paved with the residential design; and quarter-circle curbing of 25 to 55-ft. radii installed at many intersections. The work was substantially completed in 270 calendar days, and was planned to avoid interference with major streets during the November to April tourist season. Total cost was approximately \$2,500,000.

Charles Zwally — "Wholesale Street Improvements Make City Look Better, Motorists Feel Better," *Engineering News-Record*, Feb. 1.

Soil-Cement Base Construction

Soil-cement base construction was first used in San Diego in 1949, on 0.9 miles of four-lane highway over land reclaimed by dredging tidal flats. Since that time four other soil-cement projects have been completed, and a fifth is under construction.

Specifications on the first job called for a 3-inch asphaltic-concrete pavement to be placed on a 6-inch base of native material treated with emulsified asphalt or with portland cement. Soil samples of the base materials were analyzed in advance of construction, and laboratory control was maintained in the field. After grading, the road-bed material was pulverized, 7% to 10% by weight of bulk cement spread and mixed with sub-base material and water, and finally shaped with a grader and compacted with pneumatic-tired and steel-tired rollers. A bituminous curing seal was immediately applied. After a seven-day curing period the plant-mixed asphaltic concrete pavement was applied.

Russell A. Hall—"One Soil-Cement Job Leads to Another," *American City*, February.

Pavement Joint Cleaning and Resealing

Contractors employed to clean and reseal joints in concrete pavements in Minnesota have used equipment effectively to accomplish the work. Old sealing material was routed from the joints by a cleaning machine which employs a 12-inch cutter head driven at 2,400 rpm by a 13.3 hp gasoline engine. Width of the cut may be varied from $\frac{3}{8}$ " to $\frac{1}{2}$ " by changing the spacing of the cutters; the depth, up to $1\frac{1}{4}$ " maximum, is controlled by the operator. Individual cutters are loosely mounted to permit cleaning of winding cracks and fissures. The



HELTZEL

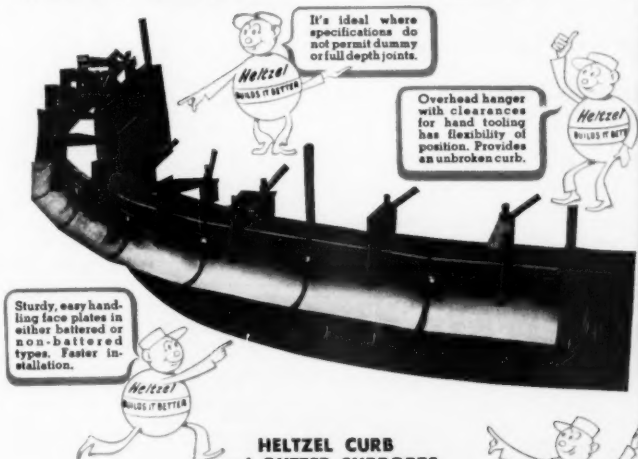
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machine cleans 5,000 to 20,000 feet of joint daily. In some sections of highway, where the centerline joint contained a bituminous material inset to form a traffic stripe, the material was ripped out by a patrol grader fitted with a 2 1/4" blade on the scarifier. Cleaned joints are thoroughly scarified with a rotary wire brush, blown out with a jet of air at 85 psi, and then filled with a thermoplastic rubber-asphalt joint compound to within 1/8" of the adjacent pavement surface. Contracts for this work were let on a "price per pound of rubber-asphalt sealing compound placed" basis, a plan said to reduce the tendency to skimp on materials and to discourage excessive joint cutting or widening.

"Minnesota Reseals Pavement Joints Fast," *Construction Methods and Equipment*, February.

Extension of the Pennsylvania Turnpike

Extensions to the Pennsylvania Turnpike, which will add 167 miles to the length of the original section, have improvements based on experience with the original turnpike. Foremost of the time, labor and money savers was route mapping

from the air, estimated to have reduced the mapping and locating job by two years. Extensive geological and geophysical studies took much of the guesswork out of the depth and nature of cut sections.

In general the design follows that of the original turnpike, with two 24-foot concrete roadways separated by 10-foot grassed median strip and 10-foot stabilized shoulders. The median strip, instead of being elevated, is depressed slightly, with catchbasins spaced about 400 feet. A continuous 6-in. subdrain is located under the median strip to collect groundwater. In cuts, special inlets collect surface water and a 6-in. subdrain under the ditch line intercepts groundwater. Another change, designed to reduce mud pumping damage, is the use of a 6-in. granular subgrade extending under the full 78 feet between the outer edges of the shoulders. Corrugated metal pipe, most of it paved and coated, is used extensively for drainage and subdrainage. In some parts of the mountainous western extension this pipe is placed beneath fills of 50 feet or more. Cost of the 100-mile eastern extension is expected to run about \$864,000 per mile, while the western extension

PUBLIC WORKS for April, 1951

will be about \$1,170,000 per mile. The original turnpike, with slightly different design cost \$461,000 per mile.

C. W. Carleton—"The Pennsylvania Turnpike Stretches East and West," *The Highway Magazine*, January.

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Asphalt Institute Quarterly

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More Roads for Less Money. By Bernard E. Gray, Pres. Asphalt Inst. January, Pp. 10-13.

Better Roads

Building Serviceable Roads for an Agricultural County. By O. H. Zack, Co. Engr. February, Pp. 23-24, 40.
Opportunities in Precast Bridges. By R. B. McMillan, Sr. Highway Bridge Engr., B.P.R. February, Pp. 25-26, 38.

Public Works

4-Lane Highway for Puerto Rico. March, P. 37.
One-Side Parking Aids Street Cleaning. By Henry Lieberman, Dept. of Sanitation, New York City. March, Pp. 38-39.
Unusual Construction Problem on Sandspit Highway. By Mark McMillan. March, Pp. 43-43.

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easy, with no inconvenience to public. No. 10 Koehring Mud-Jack, illustrated, is particularly suited to city maintenance because it's a small, self-contained unit . . . no traffic detours necessary. Portable as a wheelbarrow on the job . . . quickly moved job to job. Big, No. 50 Mud-Jack also available for extensive highway work. Get complete Mud-Jack facts from your Koehring Distributor today.

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Civil Engineering

Houston Urban Expressways Promise Savings of \$2,750,000 Annually. By *W. J. Van Londen*, Engr., Texas H'way Dept. March, Pp. 21-23.

Construction Methods

Application of Scrapers and Routers. By *Dan K. Heiple*, Chf. Field Engr., R. G. Le Tourneau. March, Pp. 62-64, 66-67.

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Mixed-in-Place Mat Tried on Town Road. March, Pp. 36-37.

Contractors Record (England)

Prestressed Concrete Road at Crawley, Essex. Feb. 14, Pp. 23-25.

Engineering News-Record

How Kansas Built a Concrete Test Pavement. March 15, Pp. 37-40.
Reinforced Concrete Sheds to Keep Snow Off Highway. March 15, Pp. 42-43.

Municipal Engineering (England)

Prestressed Concrete Road Laid at Crawley. Feb. 23, Pp. 94-95.

Roads and Road Construction (England)

A Progressive Signposting System. By *Bernard Goughall*, February, Pp. 36-39.

Roads and Streets

Hard-Facing Equipment Against Wear. February, Pp. 33-37, 50.
Joint Cleaning and Resealing Performed by Contract in Minnesota. By *J. C. Rubbers*, Asst. Maint. Engr., Minn. H'way Dept. February, Pp. 38-42.
Recent Engineer Corps Developments in Airport Pavement Design. By *Gayle McFadden*, Chf. Airfields Branch, and *Thomas Pringle*, Chf. Runways Section, Dept. of the Army. February, Pp. 43-50.

South African Municipal Magazine

How Road Traffic Signs Affect Traffic Control and Road Safety. January, Pp. 27-29.

The Surveyor (England)

Uses of Fine Cold Asphalt. By *R. D. Moody*, Dep'y Boro Engr. of Stretford. Feb. 16, P. 87.
Prestressed Concrete Road at Crawley, Essex. Feb. 16, Pp. 93-94.
Inspection of Bridges and Allied Structures. By *R. E. Walsh*, Bridge Engr., Essex Co. Feb. 23, Pp. 103-105, March 2, Pp. 127-128.

Snow Control Structures For Roads

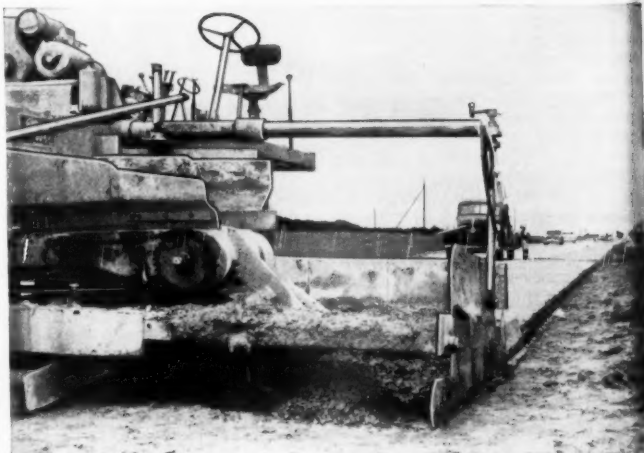
This is a report of snow research in the Ardenner Mountains, by K. Croce and J. Kayser, which was published in German and came to us via Highway Research Abstracts. The main conclusions are:

(1) *Design.* Deposition of snow is more regular if vertical rather than sloping fences are used. Vertical slats set up vertical eddies, which cause sharp-crested drifts close to the fence; horizontal slats cause flatter drifts at a greater distance. Sloping fences have much the same effect as a continuous wall, causing deep drifts close to the fence. (2) *Gap Below the Fence.* If this is large deposition begins some distance from the fence and gradually increases towards the latter. If small, deposition begins close to the fence on both sides and is more concentrated than if the gap is large;

if there is no gap, the snow is deposited on and around the fence itself. (3) *Height of Fence.* This is unimportant except in long periods of snowfall, when a low fence becomes choked sooner than a high one. (4) *Proportion of Solid Area in Fence.* If this is large, deposition near the fence is heavier than if spaces are large. (5) *Slope of Ground.* A gradual downward slope behind the fence causes the snow to be carried farther from the obstacle than on flat ground or ground with an upward slope, and drifts tend to be smaller. (6) *Angle of*

Incidence. A large angle of incidence, corresponding with low wind-force, permits deposition over a greater area, and farther from the fence, than if the angle is smaller (i.e. in high wind). (7) *Wind.* This may be the most important factor in drift-formation, as it influences both the amount of snow carried and the angle of incidence, and changes in direction modify the position and shape of existing drifts. (8) *Amount of Snow Deposited.* Estimates based on the dimensions of drifts must be regarded as very rough approximations.

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PUBLIC
WORKS

DIGESTS

THE SEWERAGE AND REFUSE DIGEST

**Drying Sludge
For Soil Conditioner**

A pile of sludge from the South St. Paul trickling filter plant about 8 ft. high and covering about 4 city blocks is being converted into a soil builder and fertilizer by a private company, which dries it by means of an Arnold dehydrator, which reduces the moisture content from 50% to 60% to about 8%. It is brought to the dryer by dragline and belt conveyor, a beater breaking up lumps before it enters the dryer. From the dryer the sludge is blown to a cooling collector and ground to granular consistency by hammermills. It contains about 2% nitrogen, 2% phosphoric acid and 0.75% potash. It is sold in carload lots to golf courses, cemeteries, orchards and parks, and in 5-lb. to 50-lb. bags. High school boys last summer made quite an income soliciting jobs of lawn feeding and distributing the sludge on lawns by means of spreaders.

"Sewage Sludge Converted to Soil Builder and Fertilizer;" **PUBLIC WORKS**, March.

**Deep Trenching
And Jacking Pipe**

In digging a trench 30 ft. deep in hard clay for storm drains in Tonawanda, N. Y., the contractor used tractor-drawn scrapers with tractor pushers. They sliced down the trench rapidly, hauled the clay 200 to 300 ft. away cheaply and eliminated the load of excavated material on the banks. Steel sheet piling was used, with bracing consisting of 6" I-beam and pipe-diagonal trusses 30" long and 5 ft. deep, welded together. Jacking was used for putting a 96" reinforced concrete pipe 130 ft. long through a highway embankment. Four 100-ton hydraulic jacks were used in a jacking pit 17 ft. long. The pipes were started on a railroad-rail and concrete template 10 ft. long. Digging ahead of the pipe was done with clay spade, and the earth re-

moved back through the pipe by an electric-driven conveyor belt.

"Putting Down a Big, Deep Storm Drain;" *Engineering News-Record*, Feb. 22.

**Benefits
From Preaeration**

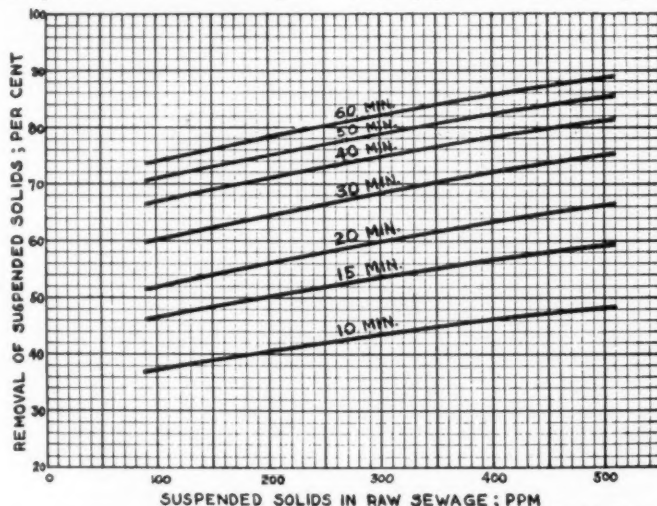
Data from 51 preaeration plants were studied by the author and apparently demonstrated that preaeration establishes a positive (oxidation) potential and prevents septicity of domestic sewage in 5 to 15 min.; readily removes entrained H_2S and CO_2 gases in equally short periods of time; and increases efficiency of grease separation to 60% or better by 20 or 30 min. preaeration. Mechanical and biological flocculation of solids commences with short periods of aeration and continues steadily as the aeration period is increased. He believes that preaeration will improve the treatment results generally at practically any sewage plant, and that it accomplishes more in actual per-

formance or analytical results per total dollar expended than any other step of primary or secondary treatment.

Frank C. Roe—"Preaeration and Air Flocculation;" *Sewage and Industrial Wastes*, February.

**Construction
During 1950**

During 1950 there were under construction 1131 sewage and industrial wastes plants to serve a population of 20,012,754 and estimated to cost \$317,312,000, not including those in three states for which data were not available. Some of these had been begun in 1949, others had not been completed by the end of the year. As to construction in 1951, there naturally is hesitation to express predictions, but the general feeling seems to be a combination of pessimism with hope that "the necessity for preserving our water resources is now so generally accepted that war industries as well as domestic populations will not be per-



● REMOVAL of SS by preaeration with 120 min. sedimentation.
Courtesy of Sewage & Industrial Wastes

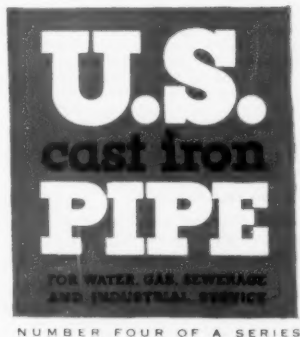


Richmond's State Capitol, completed in 1792, as it looked 100 years ago

Richmond, Virginia, has a cast iron water main in service that was installed well over a century ago. In those stage-coach days, *traffic shock* caused by heavy trucks and buses was, of course, undreamed of. There were no sewers and other underground conduits to cause soil disturbances and settlement. Yet this rugged old pipe had what it takes in shock-strength and beam-strength to meet unforeseen stresses. Strength, as well as effective resistance to corrosion, are prerequisites of long life in pipe to be laid under city streets. This is evidenced by the fact that cast iron water and gas mains, laid over a century ago, are still serving in the streets of more than 30 cities in the United States and Canada.

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General Offices, Burlington, N. J.
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mitted to deteriorate to any great extent our present existing natural stream conditions." (From statement by J. K. Hoskins, Asst. Surgeon General, U.S.P.H.S.)

"Over 1100 Treatment Plants Under Construction in 1950" and "What Does the Future Hold?," *Wastes Engineering*, March.

Flushing Effect of Tidal Estuaries

The tidal prism concept has generally been used to evaluate the ability of an estuary to disperse introduced pollution. A survey made by the Woods Hole Oceanographic

Inst. has shown that estuaries do not flush as rapidly as the tidal prism calculation would indicate. This paper explains the incorrectness of the assumptions that the sea water entering the estuary mixes completely and uniformly with the water present therein at low tide and that the volume of water moving seaward on the ebb tide escapes and is not returned on the next flood tide. The tidal flushing theory expounded by the author permits calculation of the concentration and quantity of river water in various parts of the estuary for various volumes of river flow, permitting the

calculation of the dilution of any pollutant carried by the river water; and the mean life of the river water in any segment of the estuary, and the average time required for the river water to reach any part of the estuary; and the total volume of water which escapes seaward, and does not return on succeeding flood tides, through various cross-sections, which is the volume of water available for the dilution of pollution introduced directly into the estuary by sewer outfalls.

Bostwick H. Ketchum—"The Flushing of Tidal Estuaries," *Sewage and Industrial Wastes*, February.

Adsorption of E. Coli on Silts

The term "adsorption" is used by the author to describe the attraction between bacteria and various types of particulate matter; not necessarily analogous to true adsorption. He finds that, in the range of turbidities usually encountered in natural waters, *E. Coli* is adsorbed to the particulate matter, the degree of adsorption being characteristic of the origin and particle sizes of the silt. Adsorption increases the rate of sedimentation of bacterial cells. Diluted sea water increases the rate of flocculation of silts, but generally decreases their capacity to adsorb.

Charles M. Weiss—"Adsorption of *E. Coli* on River and Estuarine Silts," *Sewage and Industrial Wastes*, February.

Effect of Radioactive Phosphorous on Biochemical Oxidation

A study was made of this as part of a program to determine the effect of sewage containing radioactive isotopes on plumbing and sewer systems, sewage treatment processes, and streams. It was concluded that ordinary tests of sanitary engineering significance may be carried out under radioactive conditions when the proper precautions and safety measures are observed; that radioactive phosphorus, when present in concentrations at or below 10 millicuries per liter, exerts no significant effect on the following parameters in the first stage of the biochemical oxidation of sewage: a—The reaction velocity constant of biochemical oxidation, k ; b—The ultimate first-stage B.O.D. value, L ; c—The 5-day B.O.D. y_5 . These results give

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further evidence that the tentative tolerance level of 10^{-4} microcurie per liter is safe from the standpoint of the biochemical oxidation of organic matter in streams or other water-courses.

Werner N. Grune and Rolf Eliasen—"Studies on the Effect of Radioactive Phosphorus on the Biochemical Oxidation of Sewage;" *Sewage and Industrial Wastes*, February.

Inlets for Storm Water

A study of the hydraulics of storm drain inlets is being made by the Institute of Cooperative Research of Johns Hopkins University, and a preliminary report has been made dealing with gutter inlets without depressions. The danger and inconvenience to traffic of gutter depressions has caused the abandoning of their use in modern high-speed highways. Investigation of the behavior of curb openings and other inlet forms is under way. There is little advantage in using a curb opening alongside of a grate gutter inlet unless there is a local depression, except that it will receive the flow if the grate should clog. However, if a curb opening be placed a

short distance up stream from the grate, they will give a much longer capacity than either of them alone. Various types of gutter inlets are described and illustrated, and formulas are presented for calculating their capacities.

Wen Hsiung Li, John C. Geyer and George S. Benton—"Hydraulic Behavior of Storm-Water Inlets;" *Sewage and Industrial Wastes*, January.

Sewage Treatment On Parkways

Water supply and sewage treatment for parkway service stations must generally be furnished on an individual basis. Sewage treatment most often consists of a septic tank with a subsurface tile field, leaching cesspools or an artificial subsurface sand filter. Design of these facilities must be based on the average flow, which must be computed on the basis of the number of fixtures contributing, the discharge from each fixture per use, the use cycle, and a factor of probable use. The following values are indicated, based on timing of fixtures in use and observations at Parkway service stations: toilets, 8 min. use cycle, 4.0 gal. per use; urinals, 3 min. use cycle, 2.3 gal. per use; lavatories

PUBLIC WORKS for April, 1951

(free flow), 3 min. use cycle, 4.5 gal. per use; and drinking fountains, 2 min. use cycle, 0.5 gal. per use. From these data, a maximum daily flow in gallons may be computed. This figure will be reduced by multiplying by the factor of probable use, which might range from 0.33 to 1.0.

Joseph E. Federick—"Treatment of Sewage From Parkway Service Stations;" *Wastes Engineering*, February.

Industrial Sewer Rental Charge

Sewage from Winchester, Va., is drained into a small creek, and the proper treatment of these wastes has been a major problem. The problem is further complicated since the industrial waste load required a treatment plant for a population equivalent of 50,000 for this community of 15,000 persons. In order to prolong the useful life of the plant, sewer ordinances related to the nature of wastes discharged to sewers were more rigidly enforced, and a schedule of sewer rental charges were inaugurated which would provide a financial incentive to industry to reduce the strength of its wastes. Determining factors in this formula are the BOD, sus-

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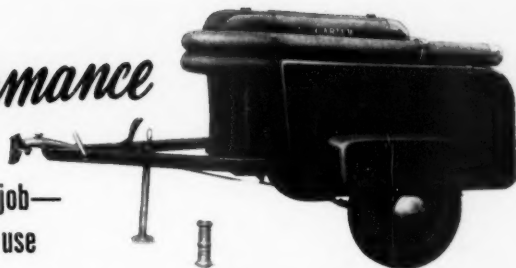
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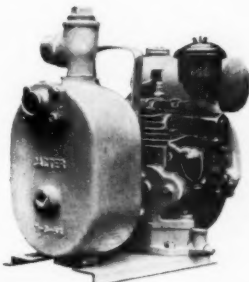
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pendent solids and volume of the sewage. These factors were determined for each industrial plant contributing wastes; charges are made regularly based on water consumption for the period. Conclusions drawn by the author are as follows:

1. That practically all communities are, or will be confronted with the problem of treating industrial wastes.

2. That industry should pay its fair share of the cost of treatment and that this is a legitimate cost of production item.

3. That, where possible, a readily understood and uniform method of computing sewer service charges should be adopted.

4. That the method and formula adopted should offer a financial incentive for industry to reduce the strength and amount of wastes discharged to the sewer system.

5. That an incentive method of computing sewer service charges for industry will release sewage treatment plant capacity, which becomes available to other industry or for additional domestic sewage.

Samuel H. Reeves—"Industrial Sewer Rental With Incentive Base," *Water & Sewage Works*, February.

Treatment in The Far North

For some areas of Alaska, designers of treatment plants must provide for temperatures as low as -50° to -70° , and where, for 100 to 240 days of the year the temperature does not exceed a maximum of 32° . These conditions seriously affect both design and operating methods, and provision for the safety and comfort of the operating personnel. It is necessary to house screens, bar racks, shredders, detritus tanks and grit chambers to prevent their freezing. Settling tanks are least vulnerable to cold; trickling filters are probably the most so. There has been little trouble with activated sludge units. It requires more heat to keep digestion tanks at the desired temperatures. It takes sludge on drying beds 3 to 6 times as long to become handleable. When sludge is placed in lagoons, this delay is partly offset by the effect of freezing, which tends to separate water from solids with which it is mixed.

To prevent the freezing of trickling filters, it seems desirable to keep the dosing rate above a certain minimum (since the sewage is warmer than the air), which can be

done by recirculation; and by providing a number of units, some of which can be withdrawn from service and immediately drained as the sewage flow decreases. To a less extent, this providing of multiple units applies to other types of plant also, for the same reason. All major plant units should be covered or housed. Tanks should be so designed that they can be drained rapidly and completely. Provision should be made for emergency heating of important devices. The capacities of tanks and filters should be determined with due regard to the adverse effect of low temperatures upon treatment efficiencies and upon the rate of self-purification in receiving waters.

Harold Allen Thomas, Jr.—"Sewage Treatment in Low-Temperature Areas," *Sewage and Industrial Wastes*, January.

Treatment of Radioactive Wastes

Many of the methods used for treating industrial wastes may be used for treating radioactive wastes. But after separating the wastes into their liquid and solid fractions, the radioactive fraction remains to be

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to concentrate this into a smaller volume to permit disposal as either sludge or slurry. If incineration is employed, precautions should be taken to prevent contamination by volatile gases or fly ash. After reduction of volume, the material then may be placed in suitable containers and buried in controlled areas or stored for decay or future recovery.

Conrad P. Straub—"Removal of Radioactive Materials from Waste Solutions;" *Sewage and Industrial Wastes*, February.

Mixing Chlorine with Sewage for Disinfecting

A study of mixing chambers and contact tanks of five New Jersey plants led to the conclusions that excellent distribution of the chlorine in the sewage is obtained where there is a special mixing compartment; but where there is not, the distribution is not uniform. Where the chlorine is applied directly at the head of the contact tank, better distribution can be obtained by lowering the baffle to within 2 to 3 ft. of the bottom. Vertical channels or relatively shallow mixing compartments ahead of the contact tank with high turbulence provide adequate mixing, obviating the necessity for adequate mixing.

H. Heukelekian and Robert V. Day—"Disinfection of Sewage with Chlorine;" *Sewage and Industrial Wastes*, January.

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Putting Down a Big, Deep Storm Drain. Feb. 22, Pp. 36-38.
A Realty Company Builds and Operates a Sewage Plant. March 1, Pp. 42-43.

Municipal Engineering (England)

Sewage Deposits on British Beaches. Feb. 9, Pp. 68-69.
Using the Gas Byproduct from Sludge Digestion at Beddington. Feb. 23, Pp. 98.

Public Works

Additions Quadruple Sewage Plant Capacity. By M. E. Boyden, City Engr., Moorhead, Minn., and Randolph L. Smith, Cons. Engr. March, Pp. 35-36.
New Materials and Methods for Pest Control. By Arnold M. Livingston, Chem. Insecticide Corp. March, Pp. 46-47, 62.
How to Design a Septic Tank for Use With a Food Waste Disposer. March, Pp. 51-52, 60.
Controlling Rats in New York City. By W. A. Hardenbergh, Cons. Engr., to Dept. of Health, and J. J. Weinstein, Asst. Dir., Rodent Control. March, Pp. 53-55.
Sewage Sludge Converted to Soil Builder and Fertilizer. March, Pp. 56.

Sewage and Industrial Wastes

Precipitation and Air Flocculation. By Frank C. Roe, Eng'r Carborundum Co. February, Pp. 127-140.

Studies on the Effect of Radioactive Phosphorus on the Biochemical Oxidation of Sewage. By Werner N. Grune, Research Assoc. New York Univ., and Rolf Elhassen, Prof. of San. Eng., Mass. Inst. of Tech. February, Pp. 141-154.

Disinfection of Sewage with Chlorine. By H. Heukelekian and Robert V. Day, N. J. Agri. Exp. Sta. February, Pp. 155-163.

Simplified Method for Analysis of B.O.D. Data—A Discussion. By J. D. Lee, Assoc. Prof. of Civ. Eng., Queen's University. February, Pp. 164-166.

Assimilation of Dairy Wastes by Activated Sludge. By Sam R. Hoover, Lenore Jasiewicz, Janet B. Pepinsky and Nandor Forges, U. S. Dept. of Agriculture. February, Pp. 167-173.

Chemistry of Waste Cyanide Treatment. By David Milne, Chem. Engr., General Motors Corp. February, Pp. 174-180.

Waste Disposal at a Synthetic Rubber Plant. By L. D. Dungan, Asst. Mgr., and J. C. Bell, Process Chemist, Polymer Corp. February, Pp. 181-187.

Observations on the Removal of Radioactive Materials from Waste Solutions. By Conrad P. Straub, San. Engr., Oak Ridge Nat'l Lab. February, Pp. 188-193.

Chemical Waste Disposal at Victoria, Tex., Plant of the Du Pont Co. By H. W. de Ropp, E. I. du Pont de Nemours & Co. February, Pp. 194-197.

The Flushing of Tidal Estuaries. By Rostwick H. Ketchum, Woods Hole Oceanographic Institution. February, Pp. 198-209.

Domestic and Industrial Water Supply and Pollution. By L. R. Hoxson, J. H. Allen, M. B. Cunningham, J. C. Frye, R. E. Lawrence, F. W. Mohlman, S. T. Powell, A. M. Raven and A. D. Weston. February, Pp. 210-226.

Absorption of E. Coli on River and Estuary Silts. By Charles M. Weiss, Dept. of Biology, Johns Hopkins Univ. February, Pp. 227-237.

Precipitation Tank Operation at an Activated Sludge Plant. By John S. Whitney, Supt. Sewage Plant, Dade Co. Port Authority. February, Pp. 238-240.

Trucking Filter Fly Control. By Arnold M. Livingston, Chem. Insecticide Corp. February, Pp. 241-244.

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The Surveyor (England)

Sewage and Sewage Disposal in 1950. Feb. 16, Pp. 89-91. Feb. 23, Pp. 103-107.

Wastes Engineering

Over 1100 Treatment Plants Under Construction in 1950. March, Pp. 125-135.
Trends in Wastes Treatment Design and Construction. By 23 State sanitary officials. March, Pp. 136-144.
What Does the Future Hold? Forecast of Effect of National Emergency. By 8 sanitary engineers. March, Pp. 147-152.

Two-Way Radio Speeds Street Maintenance

When new radio equipment was installed, a year ago, in the Keene, N. H., police department cars, the old radio equipment was transferred to the pick-up trucks of the public works department, which handles street maintenance, sewers and water. Radios were installed in trucks operated by the various department foremen and in the superintendent's truck.

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To Investigate Public Health Hazards

The Ohio River Valley Water Sanitation Commission is undertaking an investigation to determine if unsuspected public health hazards exist as a result of trace constituents from industrial or other wastes reaching streams. Initial step was a recent contract with the Kettering Laboratory of Applied Physiology, which will act as a consultant and conduct some phases of the work. Among the problems to be investigated will be the high chloride content of some waters due to brine discharge, and the possible toxicity hazard due to the use of newer and more powerful insecticides.

Pennsylvania Approves Compaction Roller

The Pennsylvania Highway Department has approved the use of the Huber compaction roller for compaction of fills and similar work. This unusual type of roller has a per lineal inch compaction of 5,387 pounds and is said to be able to compact 41,000 sq. ft. per hour at average speeds, operating in either direction.

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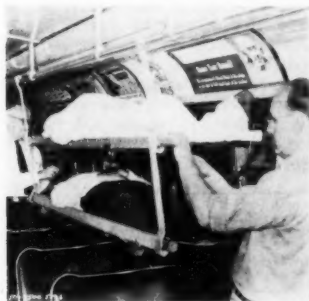
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Buses Equipped with Stretcher-Bearing Facilities

The new fleet of 400 Model C-50 Mack buses for the New York City Board of Transportation are so designed as to be immediately convertible to carrying stretchers. The



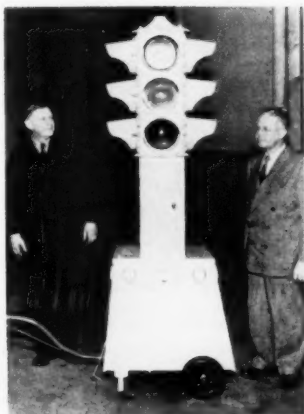
Stretchers in Mack Bus.

seats do not need to be removed, and no changes are necessary in the buses to convert them to carrying patients. There is room for 16 stretcher cases and for 23 other injured. The 45-inch wide front door makes it easy to carry stretchers into the bus. An excellent folder is available describing how easily this is done. Write Mack Manufacturing Corp., Bus Division, Empire State Bldg., New York 1, N. Y., or use the coupon.

Use coupon on page 139; circle No. 4-1

Portable Traffic Signal Generates Its Own Power

A portable traffic signal, having its own generated power supply, is mounted on rubber tired dolly wheels, enabling it to be moved readily to any point where emergency traffic control is necessary. This unit resulted from the ideas of E. E. Leedy, City Electrical Inspector of Marion, Ohio. It has a 400-watt Onan generator in the base which produces the 110-volt cur-



Portable traffic signal.

rent necessary to operate the lights. The signal is designed to operate in the conventional manner, but can be switched over to show red lights on all four sides. It is designed to be used at accidents, disasters, and other places of excessive traffic congestion. More information on how to build such a unit from D. W. Onan & Sons, Inc., Minneapolis, Minn., or by using the coupon.

Use coupon on page 139; circle No. 4-2

Mobile Combination Two-Way Radio

The new 50-watt mobile two-way radio, announced by General Elec-



GE 2-way radio.

tric, is for use on the 148-174 mc band. It has triple tuned transformers and a built-in low pass harmonic filter in the antenna output circuit which attenuates harmonics at least 70 db. Receiver circuit elements provide better than 100 db adjacent channel selectivity. Stand-by battery drain is 11 amps at 6.3 volts and transmit drain is 60 amps at the same voltage. Further information (ask for mobile combination 204) from G-E Commercial Equipment Division, Electronics Park, Syracuse, N. Y.

Use coupon on page 139; circle No. 4-3

Portable Light Burns 80 Hours Continuously

Designed for Civil Defense emergencies, this new portable light provides continuous light for 80 hours on each battery charge; or a higher power floodlight is available for 20 consecutive hours. The bulb has 2 filaments, providing either the long-



Burns 80 hours.

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time light or the more powerful one. The lens is shatterproof and a substitute reflector provides a searchlight with a one-mile range. The case is of cast aluminum and the unit is perfectly balanced and easy to handle. Full information is available from Carpenter Mfg. Co., Somerville, Mass., by asking for data on Type CDU, or by using the coupon.

Use coupon on page 139; circle No. 4-4

Overhead and Front-End Shovel for Protective Construction

Especially designed for civilian defense shelters and other protective construction, the "Underground Lodover" is a special adaptation of standard equipment made for IHC tractors. It has a 1 1/4-yd. capacity bucket, loads overhead in a 14-ft. shaft, and can dig its own sloping ramp into or out of a tunnel or shaft. Many useful attachments are available to make this machine widely available for many jobs. These include a dozer, winch, angle blade, boom, lift fork and snow plow. Data from any International Harvester Co. dealer, from Service Supply Corp., Philadelphia 42, Pa., or by using the coupon.

Use coupon on page 139; circle No. 4-5



Big Beam light unit.

Automatic Emergency Lighting Unit for Civil Defense

This emergency lighting unit plugs into any standard lighting outlet. Whenever the regular lighting current fails, this unit automatically switches on to provide flood lighting over a considerable area. There are two independent floodlight heads, 5 ins. in diameter, held in desired positions by friction type swivel joints. Operation is by one 9-volt standard dry battery. The container is 20-gauge steel and the overall weight, complete with battery, is about 18 pounds. Ask for information on the Big Beam 2-AD Special Automatic unit from U-C

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Lite Mfg. Co., 1050 West Hubbard St., Chicago 22, Ill., or use the coupon.

Use coupon on page 139; circle No. 4-6

Emergency Lighting in Civil Defense

Some of the indispensable needs for lighting in times of disaster are: (1) To illuminate stairways and exits; (2) to locate fire alarms, fire fighting equipment, safety valves and switches; (3) to avoid damage to fixtures and machinery; (4) to avoid contact with moving machinery; (5) to make emergency repairs; (6) to locate dangerous conditions or materials; (7) to avoid sabotage; and (8) to reduce the chance for panic and personal injury. To meet these conditions, there are available plug-in units which will automatically operate when the regular current fails, power for the light being provided by batteries within the unit. While regular power is on, these lighting units operate the same as any exit or other ordinary light. More information on plug-in lights of this type is available from Electric Cord Co., 30 Church St., N. Y., or by using the coupon.

Use coupon on page 139; circle No. 4-7

Water and Gas Mains—the First Line of Civil Defense

Broken gas mains, in time of disaster, are potential sources of fire, and once a fire starts, may feed it materially. Broken water mains prevent or seriously impair fire fighting ability. Good planning for repair and the proper tools and equipment are therefore essential. The Skinner Seal Split Coupling Clamp permits repair of broken mains in 5 to 15 minutes, according to the manufacturer. Also, leaking joints can be repaired quickly with the Skinner



Skinner split coupling.

Seal Bell Joint Clamp. These valuable repair units are described more fully in descriptive literature available from M. B. Skinner Co., South Bend, Ind., or by using the coupon.

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Use coupon on page 139; circle No. 4-9

A Tractor-Shovel for Clearing and Other Work

This tractor shovel combination has a 1 1/4-yd. bucket and is available with 60 hp gasoline or diesel engine. There are four speeds in each direction, and steering is easy because it is power-assisted. Digging angle or bucket pitch is quickly adjustable between 1 and 6 de-



Hough tractor-shovel.

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Use coupon on page 139; circle No. 4-11

Portable Power Guards City's Signal Network

The Detroit, Mich., Fire Department has installed a Kohler electric power plant with a capacity of 10,000 watts to operate the city's entire communications and signal network. The power unit is located in the central alarm headquarters building. The communications and signals system contain 120 circuits to 3,500 fire alarm boxes. Separate circuits connect the headquarters with the 80 fire stations. Telephone switchboards, the control panel for the 2-way radio, and three transmitters and receivers are also included in the alarm system. This program is part of, or connected with, the Detroit civil defense program. More information on this in-

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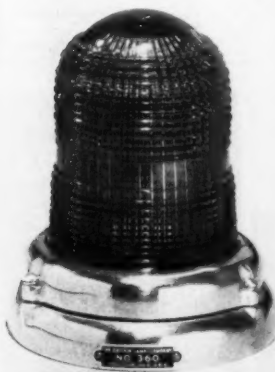
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Warning signal blinker.

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an inexpensive decontaminant for radioactive exposure, called "Versene," is now available. It is said that this material does not destroy radioactivity, but converts radioactive metals to a form which can be washed away with water. This eliminates the need for using such earlier methods as washing with strong and corrosive acid solutions. This information comes to us from Bersworth Chemical Co., Framingham, Mass.; additional information is available from that company or by using the coupon.

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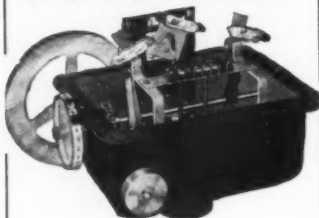


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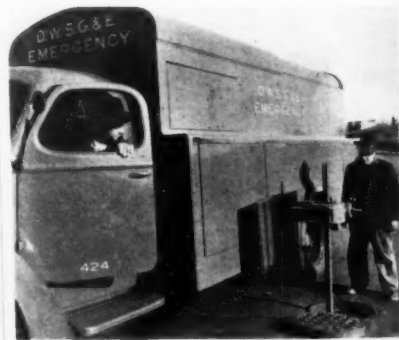
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Electric Equipment For Rescue Work

185. Homelite Carryable gasoline-engine-driven generators will supply light in all emergencies and plenty of power to operate the self-priming pumps, blowers and chain saws used by rescue teams. Get full data on these units by checking coupon or write Homelite, Inc., Dept. PW, 2103 Riverdale Ave., Port Chester, N. Y.

Sealed Repair for Broken Mains

203. Damaged water mains can be quickly and permanently repaired with Skinner-Seal split coupling clamps. Special gasket and clamp design withstands full fire-fighting pressure. For 2" to 16" pipe. Get details on this and other clamps from M. B. Skinner Co., Dept. PW, So. Bend 26, Ind. Check coupon now.

Compact Power Unit Leaves More Room for Equipment

207. When you are cramped for space compact diesel power units can help. Investigate diesel power for pumping plants and wherever dependable engines are needed. Use coupon or write Dept. PW, Detroit Diesel Engine Div., General Motors Corp., Detroit 38, Mich.

Self-Contained Automatic Lighting Unit

208. A single "Minuteman" lights approx. 10,000 sq. ft. instantly when regular power fails. Compact battery-operated unit keeps fresh by built-in trickle charger plugged into 115V. outlet. Be ready for any emergency. Send for bulletin by checking coupon. Electric Cord Co., 195 William St., New York 38, N. Y.

How Water Main Valves Can Be Quickly Closed

211. When broken sections of water mains must be isolated quickly the truck-mounted Payne Dean valve operator will do the job. Uses the truck power take-off. Get specifications by checking coupon. Payne Dean & Co., Clinton, Conn.

Power Supply from Duplex Engine Generators

253. For standby power and power supply under field conditions be sure to check the Duplex Alternating Current Engine Generator. Available in 10 KW to 30 KW sizes, single and three phase; skid or trailer mounting. For full information use coupon or write Duplex Truck Co., 830 E. Hazel St., Lansing, Mich.

Portable Light for Disaster Areas

212. A portable emergency light designed for 80-hr. service at normal intensity for each battery charge has 2-filament bulb for special high-intensity floodlight work. Check coupon for more information. Carpenter Mfg. Co., Somerville, Boston 45, Mass.

Emergency Chlorination and Main Sterilization

213. Get data on portable emergency chlorination units designed to save time in cases of broken mains or substitute water supplies. Use coupon to order copies of publications 22-C; 58-C; and 408 from Wallace & Tiernan Co., Newark 1, N. J.

Have Independent Electric Power Source

217. 16-page bulletin E-139 covers Kohler electric plants for standby service; also portable and mobile units. Full specifications help you select gasoline and diesel units. Use coupon or write Kohler Co., Dept. PW, Kohler, Wis.

Technical Consulting Service On 2-Way Radio Systems

218. Civil Defense communications by mobile 2-way radio are a vital part of your plans. Helpful technical consulting service is offered by Motorola, C & E Div., 4545 Augusta Blvd., Chicago 51, Ill. Check the coupon now.

Automatic Lighting During Power Failure

221. "Big-Beam" emergency lights go on instantly when power fails. Compact, battery-operated floodlight units are available in several models, operate automatically when plugged into conventional lighting outlet. U.C. Lite Mfg. Co., 1037 W. Hubbard St., Chicago 22, Ill. For details check the handy coupon.

Prepare for Defense and Mutual Aid

233. Full data on hand and power sprayers for effective control of public health hazards due to insects in disaster areas, and the Myers Fog Fire Pumps and Guns for fire protection, offered by F. E. Myers & Bro. Co., Dept. T-241, Ashland, Ohio. Send for descriptive literature now.

Data Offered on Emergency Pipe Lines

234. An illustrated booklet for Civil Defense Planners shows a quick, easy way to replace damaged pipe lines and broken mains for emergency water and gas service. Use coupon for your copy. Victaulic Co. of America, Box 509, Elizabeth, N. J.

Film Shows How to Beat The A-Bomb

259. A 20-minute, 16mm sound film "You Can Beat The A-Bomb" is available from McGraw Hill Book Co., Text-Film Dept., 330 W. 42nd St., New York, N. Y. Get details by using coupon.

Check This Pocket Sized Geiger Counter

227. The pocket sized Batson Geiger Counter for radiation detection registers count by neon blinker and headphone. Use coupon to get full details on this handy, inexpensive instrument. James A. Batson Electronics, Inc., 1031F So. 27th St., Omaha, Nebr.

Emergency Repairs For Damaged Lines

240. Six safe, sure ways for quick repair of damaged lines with Dresser couplings and repair products are outlined by Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa. Prepare for emergencies by getting full data now. Use the coupon.

Be Ready to Bridge Gaps and Holes

244. Rugged open grid steel grating sections can bridge holes, serve as ramps, keep traffic moving over mud and rubble. Get catalog today from Irving Sulway Grating Co., Inc., 50-53 27th St., Long Island City 1, N. Y. by using coupon.

What You Should Know About Rat Control With Warfarin

222. To learn how your city can undertake an effective rat control program with d-Con, a Warfarin product, send your inquiry to d-Con Co., Dept. PW, 112 E. Walton St., Chicago 11, Ill., or check the handy coupon.

MORE LISTINGS PAGES 140-145

Clip
and Mail Today

PUBLIC WORKS Magazine
310 East 45th Street, New York 17, N. Y.

Please send me the following literature listed in the Reader's Service Dept. of your April issue.

Booklets, pages 139-145, and Advertisements:

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New Products, pages 133-137:

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Pipe Phones (Aquaphone)....\$3.70

Globe Phone Mfg. Corp.

Manufacturers of Geophones Since 1918
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For more details circle No. 57 on card.

NEW LISTINGS (Cont.)

First Aid Essentials For Civilian Defense

246. Sturdy yet inexpensive stretchers or litters similar to latest military type, Koller-Blake Leg Splint, Thomas Arm Splint and Conq pneumatic Tourniquet are supplied by Ambulatory Splint Co., 392 Second Ave., New York 10, N. Y. Check coupon for full data on these essential items.

Self-Contained Electric Plants—1 to 150 KW

247. Electric power plants for emergency service, powered by gasoline, diesel, butane or natural gas engines, with automatic or manual controls are offered by Frasier-Wright Co., 2315 So. Hill St., Los Angeles 7, Calif. Use coupon to get full details.

Grugagrip Fittings For Quick Installation

249. A full line of fittings for grooved pipe: T's, L's, laterals, etc. in 3/4" to 12" sizes are available for use with Grugagrip Grugagrip couplings. Check coupon for your catalog. Grugagrip Mfg. Co., 1412 West 12th St., Kansas City, Mo.

Standby Engine Generators For Emergency Power

250. Get Bulletin 254-2 for full details on standby engine generator units which provide power instantly upon disruption of normal wired power. Just check the coupon or write The Ready-Power Co., 11231 Freud Ave., Detroit, Mich.

Power You Already Have Used for Digging, Trenching

228. Power takeoff of your tractor, Jeep or truck runs the hydraulically-operated Hoop digger. Backhoe digs 9 ft. deep; shovel bucket has 1/2 yd. capacity. Both swing full 180°. More details from Bodger Machine Co., Dept. P, Winona, Minn., by using coupon.

For Fast Work on Fast Driving, Pavement Breaking

251. The Ottawa Hydra-Hammer is a multi-purpose tool, ready to save time on pavement breaking, patch removal, post driving and pulling. Hydraulic power handles 400-lb. hammer, gives operator perfect control. Tows behind any car or truck. Ottawa Steel Products, Inc., Ottawa, Kans. Check coupon for full details.

Design Data for Hardness, Turbidity, Color or Algae Removal

253. Bulletin No. 9041 published by The Dorr Co. furnishes design data on the Hydro-Treater for high-rate, upflow type treatment of municipal and industrial water supplies. 32 pages include distinguishing features of the unit, types and sizes, capacity ratings and technical operating results. Get your copy of this helpful bulletin by using coupon today. The Dorr Co., Barry Pl., Stamford, Conn.

For Fast, Smooth Pipe Cuts

254. Wachs National air-powered pipe saw cuts cast iron or steel pipe from 10" to 48" dia., leaving clean-cut milled edges. Get information on this unit from E. H. Wachs Co., 1325 N. Dayton St., Chicago 22, Ill., by using coupon.

Gunite Costs Less On Repair Jobs

255. Be sure to investigate Gunite for repair of reservoirs, dams, water and sewage plant tanks, sewers, swimming pools, etc. Contact Eastern Gunite Co., Elkins Park, Pa. for full information, or use coupon.

Save Garbage Collection In Defense Housing

232. Defense housing projects won't drain manpower garbage collection when Westinghouse Waste-Away Food Waste Disposers are installed in each kitchen. Helpful information for community planners is offered by Westinghouse Electric Corp., Electric Appliance Div., Mansfield, Ohio. Just check the coupon.

Tractor-Mounted Backhoe Simplifies Digging Operations

230. Be sure to investigate the new Henry Backhoe to cut digging costs on laterals, footings, septic tanks, graves. Easily attached to your tractor. Get full data from Henry Mfg. Co., Dept. PW-451, Box 720, Topeka, Kansas, by using coupon.

How Sewer Departments Clean Catch Basins Faster

245. Cities using Hydrocranes for catch basin cleaning report better, faster, cleaner jobs. Additional excavation jobs keep these versatile units busy. Send for full data today by using coupon. Bucyrus-Erie Hydrocrane Div., S. Milwaukee, Wis.

Fast Mowing in Hard-to-Reach Places

225. The lightweight, power driven Synthetic cuts smoothly in rocky, hard-to-reach places; does the job 4 times faster than ordinary methods. Illustrated folder offered by Hoffman, Inc., Richmond, Ind. Get your copy by using coupon.

Book Tells How to Control Algae

257. A booklet giving details on the control of various microscopic organisms frequently found in water supplies is offered by Phelps Dodge Refining Co., Dept. PW, 40 Wall St., New York 5, N. Y. Check coupon for your copy.

All About Centrifugal Pumps

258. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use coupon or write to Fairbanks-Morse & Co., Dept. PW, Chicago 5, Ill.

Engineering Data On Mechanical Joint C.I. Pipe

183. General specification, weights and dimensions of mechanical joint cast iron pipe and fittings are furnished in a 32-page booklet issued by Alabama Pipe Co., Anniston, Ala. Get this helpful data by checking coupon.

Portable Electric Generators For Emergency Power and Light

103. Trailer-type diesel-electric generators are playing an important role in current civil defense programs. Griffin describes portable units ranging from 2KW to 12.5KW. Bulletin also includes stationary generators from 4KW to 31.5KW. Griffin Equipment Corp., 881 E. 141st St., New York 54, N. Y. Use the handy coupon to request copy of this bulletin.

Get the Facts on Air Raid Sirens

86. There's more to be considered in air raid warning sirens than the loudness of the signal. Get complete information on efficient size and spacing of sirens from Federal Enterprises, Inc., 8733 So. State St., Chicago, Ill., by using coupon.

Chemicals for All Pest Control Work

199. Full data on dosages and methods of application of DDT, 2,4-D, BHC and other insect, weed and rodent control chemicals is available from Chemical Insecticide Co., 285 Van Bunt St., Brooklyn 31, N. Y.

Efficient Underdrains for Rapid Sand Filters

256. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the coupon or write E. B. Leopold Co., Inc., Dept. PW, 2413 W. Carlson St., Pittsburgh 4, Pa.

Warning Sirens Give Low Cost Coverage

260. Foster type 45 siren is easily recognizable, non-directional, not affected by cold. Powerful warning signal gives low cost per sq. mile coverage. Use coupon to get descriptive Bulletin 29. Foster Engineering Co., 835 Lehigh Ave., Union, N. J.

Film Shows Pattern for Survival

261. Your community should see the documentary film showing how to save lives and prevent panic in case of atomic attack. Get full data by using coupon, or write Cornell Film Co., Dept. PW, 1501 Broadway, New York 18, N. Y.

How to Track the Path Of Air Contamination

262. The path of poisonous radioactive materials drifting in the air can be determined with Bendix-Friez Aerovanes and Windials. Get data on these instruments for civil defense installations by checking coupon, or write Friez Instrument Div., Bendix Aviation Corp., 1360 Taylor Ave., Baltimore 4, Md.

Civil Defense Communication Advisory Service

263. A free brochure designed to help your community with civil defense communications is available now from General Electric. Every civil defense official should have a copy. Order yours today by using handy coupon, or write Dept. PW, General Electric Co., Section 1041, Electronics Park, Syracuse, N. Y.

Do Your Firefighters Have Modern Equipment?

264. Check your city's fire fighting equipment now to be ready for any disaster. Get full data on Mack pumps, hose cars and ladder trucks by using handy coupon. Dept. PW, Mack Mfg. Corp., Fire Apparatus Div., Empire State Building, New York, N. Y.

Investigate "Tifa" For Insect Control

265. With "Tifa", the Todd Insecticidal For Applicator, chemicals are distributed as a true, clean fog. Use coupon for full data for civil defense or public health programs. Combustion Equipment Div., Todd Shipyard Corp., 81-16 45th Ave., Elmhurst, N. Y.

The New Concept Of Rodent Control

266. A very interesting leaflet describes rodent control with Reseratus, an economical source of warfarin in ready-to-use form, plus safety features, bait station types and other rodent control data. Use coupon for your copy. Reseratus Corp., East of Centre St., Newark 2, N. J.

Versatile Power Digger Gives Best Performance

267. All-hydraulic action of Sherman power digger gives efficient performance and converts your tractor to an excavating machine. Digs ditches, trenches, footings, culverts; has digging and loading shovels. Write Dept. PW, Sherman Products Inc., Royal Oak, Mich., or use coupon for full data.

"Triple-Threat" System For Rodent Control

268. The three factors for successful rodent control, Warfarin plus attractive bait plus effective bait station, are combined in Rocon's complete package. For details of this effective system check coupon or write Rocon, Inc., Dept. PW, 1020 Speer Blvd., Denver 4, Colo.

RCA 2-Way Radio For More Protection

269. A new brochure on RCA 2-way radio systems for public safety is available for all Public Works and Civil Defense planners. Use the coupon for your copy, or write RCA Engineering Products, Dept. P-154, Camden, N. J.

POWER AND LIGHT

Low Cost Power From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Supercharged Dual Fuel Diesels give high economy by running on the cheapest fuel available. Get complete data from Worthington Pump & Machinery Corp., Dept. PW, Harrison, N. J.

CONSTRUCTION EQUIPMENT

Your Dump Truck As a Complete Working Unit

39. The addition of a Holmes-Owen Loader to your dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy coupon for full data. Ernest Holmes Co., Chattanooga, Tenn.

Handbook of Contractors Pumps Is Easy to Use

49. Big 50-page Catalog P-10 covers de-watering pumps, pressure pumps, well points systems and electric pumps, and also features a special section of useful data which helps in the selection of the right pump for your job. Every construction engineer and contractor should have a copy of this valuable handbook. Just check the coupon. The Jaeger Machine Co., 400 Dublin Ave., Columbus 16, Ohio.

Get Both in One Valve Automatic and Manual Control

ROCKWELL BUTTERFLY VALVES



For control and quick shut-off of air, gases, chemical fluids, water, etc., the trend is to automatic valves, but many are also equipped with lever or handwheel devices for auxiliary handwheel operation. Such combinations are available on Rockwell Valves in all sizes to 72".

Rockwell Valves are built in all metals and rubber-covered for operation to 100 p.s.i. from sub-zero to high temperatures.

Get our Valve Catalog—and ask to receive "Rockwell Valve News" monthly

This 30" pipe size Rockwell Butterfly Valve for 60 p.s.i. operating pressure is equipped with a Phillie Gear Limitorque Motor Control plus a handwheel for emergency manual operation. When installed, two indicating lights show fully open and fully closed position.



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Automatic EMERGENCY LIGHTS

GO ON Instantly



For:

Government,
Military
and Civilian
Institutions,
Office Buildings,
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BIG BEAM
Model No. 2-AD SPECIAL

In panic, disaster, air raids, or whenever a failure occurs in your regular lighting service Big Beam Emergency Lights will give instant, automatic light. Two 6-inch floodlights, operating on a 9-volt standard dry battery give powerful light over a wide area.

No special wiring. Plugs into any conveniently located 115-volt lighting outlet, either AC or DC—a Must for Civilian Defense.

Write for Complete Details on
This and Other Models

U-CLITE MANUFACTURING CO.
1037 W. Hubbard St., Chicago 22, Ill.

For more details circle No. 221 on card

Data and Pictures of Complete Line of New Ford Trucks

58. Check this number on the coupon for colorful circular showing new Ford Trucks for every hauling need, available in great variety of standard, factory-built chassis and body combinations. Be sure to check these trucks on your job. Truck and Fleet Sales Dept., Ford Motor Co., Dearborn, Mich.

Handy Catalog Covers Complete Tractor and Grader Line

70. A new 20-page booklet in a handy pocket size features Allis-Chalmers complete industrial tractor line. The importance of wise buying and fitting the equipment to the job is emphasized. Don't miss your copy. Use coupon today. Allis-Chalmers Mfg. Co., Tractor Div., Box 512, Milwaukee, Wis.

Drill Concrete With Your Ordinary Electric Drill

82. Substantial cost-per-hole savings are claimed for Tilden Rotary Drills which penetrate concrete 2" to 4" per minute. Cutters can be resharpened. Available in sizes 1/4" to 4". Get full data from Tilden Tool Mfg. Co., 209 Los Molinos, San Clemente, Calif.

Special Pumps to Fit Any Dewatering Job

101. Centrifugal Pumps. Long lasting, self-priming, non-clogging pumps for quickly dewatering trenches and similar construction jobs. Ask for Bulletin 7-LW-13. Gorman-Rupp Co., 320 No. Bowman St., Mansfield, Ohio.

Bucket Loaders for All Materials Handling

132. Wheel- or crawler-mounted bucket loaders, 3 to 4 cu. capacities are described in Form 501 issued by N. P. Nelson Iron Works, Inc., Clifton, N. J. Use the coupon today for full data on these versatile machines.

Proper Garage Ventilation Aids Equipment Maintenance

156. Cold months hamper motor maintenance in closed buildings unless proper ventilation is available. It will pay you to investigate the

"National" garage ventilation systems for convenient removal of exhaust gases. Both under-floor and overhead designs are shown in detail in new bulletin. Use coupon or write to National Systems of Garage Ventilation, Inc., Dept. 16-A, 318 N. Church St., Decatur, Ill.

Combination Overhead And Front-End Shovel

194. The "Lodover", described in Bulletin LO 200, is a combination overhead and front-end shovel for International T-9 and TD-9 tractors. By digging in front, swinging load overhead and dumping to the rear, extra yards are handled every hour. Regular front-end loading is not impeded in any way. Service Supply Corporation, Philadelphia 32, Pa. Check handy coupon.

Helpful "How To Use" Section Aids Roller Selection

195. In addition to specification and illustrations of roller operation, the new Buffalo-Springfield catalog features a special section to help in the selection of the right roller model for the job. Be sure you get top results from your roller selection by checking this helpful material. Use the coupon for a copy. Buffalo-Springfield Roller Co., Springfield, Ohio.

The Easier Way For Pavement Breaking

220. Rapid Pavement breaking the low cost way is described in bulletin issued by the R.P.B. Corp., 2751 East 11th St., Los Angeles, Calif. Both "Mighty Midget" and heavy-duty truck-mounted models make quick, clean cuts, break trench openings or tamp backfill. Use coupon for full data.

STREETS AND HIGHWAYS

Your Property is Worth Good Protection

176. When installing link fence you want protection against rust and corrosion as well as vandalism. Investigate chain link fence made of "Konik" metal described in "Planned Protection" published by Continental Steel Corp., Kokomo, Ind.

GET THOSE WEED ROOTS!

GO TO THE ROOT OF YOUR WEED PROBLEM WITH THESE DOLGE PRODUCTS



Please write for descriptive literature explaining how these tested DOLGE products can best be used for your weeding requirements.

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Where no vegetation whatever is desired such as your parking places and walks. Penetrates deep down to plant roots and kills. Sterilizes the soil, preventing normal sprouting of wind-blown seeds. Weeding the thorough, modern chemical way eliminates backbreaking toil and saves the cost of many labor-hours.

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The efficient way to control weeds on your seeded areas. Works its way down into the roots of brush, dandelion, plantain, poison ivy, ragweed, sumac and other obnoxious plants, but does not injure most turf grasses.

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For more details circle No. 66 on Readers' Service card

How the Mobil-Sweeper Can Improve Street Sweeping

23. Sweeping costs can be cut with the new Mobil-Sweeper which features safe highway speeds up to 55 mph, carries 2 2/3 cu. yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no obstacle. Write to The Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif. or use coupon for complete details on this machine.

Levels Sidewalks and Curbs Quickly and Easily

29. How the Mud-Jack Method for raising concrete curbs, gutters, walls and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a new bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 10, Wis.

Do You Have Complete Black Top Equipment Data?

41. In 36-page catalog AFA a full line of equipment for black top road construction and maintenance is covered. Units described and illustrated include several models of pressure distributors, supply tanks, sprayers, brooms, asphalt kettles, portable rollers, and accessory tools. Use coupon for copy of the handy manual. Littleford Bros., 452 E. Pearl St., Cincinnati 2, Ohio.

How to Keep Your Loader On the Job

50. Don't take more time to move your loader to the job than to do the work. Investigate the Eagle Truck Mounted Loader for handling gravel, sand, cinders, snow from windrows or piles. Get forms 44 and 947 from Eagle Crusher Co., Inc., Galion, Ohio.

Municipalities Make Equipment Dollars Go Further

55. Be sure to get your copy of "Saving Facts" a new illustrated booklet prepared by The Oliver Corp. that shows how equipment dollars can be stretched on municipal work. Text and photos describe the application of tractors and money-saving attachments in street maintenance, snow removal, waste disposal, pipe laying and other projects. Write The Oliver Corp., Industrial Div., 19300 Euclid Ave., Cleveland 17, Ohio.

How to Beat The Weed Problem

66. Be sure to investigate weed control with selective chemical weed killers that get roots and all. Send in coupon today for bulletins on Dolge products that will rid roadsides, parks and lawns of the weed nuisance. C. B. Dolge Co., Dept. PW, Westport, Conn.

Helpful Data on Distributors For Bituminous Materials

104. Two models of pressure distributors featuring uniform pressure and temperature, accurate displacement pumping and fast loading are covered in Bulletin RS 31549 and RS 12046, available from Standard Steel Works, Dept. PW, North Kansas City, Mo. Check the coupon to request your copies.

Latest Bulletins on the Hough "Payloaders"

107. Carrying dirt and backfill, loading snow, grading and bulldozing are a few of the many jobs quickly handled by public works departments that use Hough "Payloaders". Several models having bucket sizes from 12 cu. ft. to 1 1/2 cu. yds. are offered. Check them all to see which is best suited for your jobs. The Frank G. Hough Co., 709 Sunnyside Ave., Libertyville, Ill.

Maintenance Means Many Tractor Jobs

139. Road maintenance means an unending list of jobs to be handled by tractors, either by tractor-mounted accessories or towed equipment. A new 8-page folder, "Make Maintenance Dollars Give More Mileage", tells how International crawler and wheel tractors are helping maintain city, county and state roads throughout the country. Get your copy by checking the coupon. International Harvester Co., 180 N. Michigan Ave., Chicago, Ill.

How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept. PW, Warren, Ohio.

Road Widening With Concrete, Bituminous Mix or Gravel

149. All types of road building materials are handled quickly and accurately by Aspec Wideners. New illustrated bulletin shows operations on all types of widening strips, gives details on wideners and trench rollers. Issued by All Purpose Spreader Co., Elyria, Ohio.

Versatile Maintainer Has Year 'Round Usefulness

151. A new bulletin shows how the sturdy Huber Maintainer will work for you the year 'round on maintenance jobs, berm leveling, road planing, bull-dozing, snow plowing, brooming, mowing shoulders and as a patch roller. Good ideas on how to do all these jobs in Bulletin No. M-158. Write Huber Manufacturing Co., Dept. PW, Marion, Ohio.

How You Can Improve Your City's Street Cleaning

162. The Austin-Western Model 40 sweeper features three wheel design, front wheel steer, for easy maneuvering; rear broom to sweep dirt and refuse directly into 2nd hopper; built-in flushing device. Diagrams showing all operations and full specifications in Bulletin AD-2042, issued by Austin-Western Co., Aurora, Ill.

Useful Data for Highway Builders In Barrett Road Book

190. The latest edition of "The Barrett Road Book" has 54 pages of helpful tables and step-by-step outlines of highway maintenance and construction with Tarvis and Tarvis-lithic. Tables show quantities per yard and mile, aggregate gradings; costs; many others. Get this useful book from Barrett Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

Investigate "Package" Bridges To Speed Construction and Save Money

219. Three basic elements of precast reinforced concrete—cribbing, bridge seat and bridge deck slabs—are combined for construction of bridges up to 40' span. Details of the units, and a construction story in step-by-step pictures are contained in the new PB-50 Bulletin issued by Universal Concrete Pipe Co., Columbus 15, Ohio. The handy coupon will get your copy quickly.

SEWERAGE AND WASTE TREATMENT

What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, 327 Fifth Ave., Pittsburgh 22, Pa. Check the coupon and we will forward your request.

Packaged Sewage Treatment—Just Right for Small Places

36. "Packaged" Sewage Treatment Plants specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2348 Wolfgram St., Chicago 18, Ill.

How to Make Better Sewer Pipe Joints

37. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston Co., Dept. P.W., Adams, Mass.

How You Can Dispose Of Sewage Solids

54. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Dept. PW, Nichols Engineering and Research Corp. 70 Pine St., New York 5, N. Y.

Engineering Data on Digester Heating

52. An excellent 32-page bulletin covering all features of the PET External Heater and Heat Exchanger unit discusses effective digester heating, size of heater and exchanger,

space requirements, building heating, and related items. Curves and tables provide full data for the designer. Check the coupon for your copy of this comprehensive bulletin, No. 235. Pacific Flush-Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

How Cities Can Do Complete Sewer Cleaning From Street

98. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Power machines available in addition to full line of sewer rods and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

Get This Data for Your Laboratory

119. "Water and Sewage Analysis," a 32-page booklet, describes and illustrates equipment for making convenient and accurate water and sewage analyses, including comparators, aqua testers and turbidimeters. Hellige, Inc., 3718 Northern Blvd., Long Island City 1, N. Y.

Need Low-Cost Air For Sewage Treatment?

122. New 20-page booklet shows operating and construction features of Rotary Positive blowers engineered to fit your needs. Air for activated sludge, water treatment; constant vacuum for filtering. Bulletin 22-23-B-13 gives details. Roots-Connorsville Blower Corp., 510 Poplar Ave., Connorsville, Ind.

Recording Meters for Parabolic Flumes

73. Engineering data on parabolic flumes and accurate companion meters for open flow water and sewage metering is given in Simplex bulletin 210. Installation data and calibration included. Write Simplex Valve and Meter Co., Dept. 3, 6750 Upland St., Philadelphia 42, Pa.

All Electric Floatless Liquid Level Control

78. Description of operating principles and applications of R/W controls shows the 21M-

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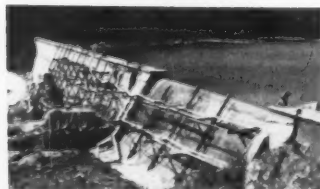
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slicity and many uses of these all-electric, floatless devices. Diagrams of typical installations and engineering data all in bulletin 147 issued by R/W Controller Corp., Dept. PW. 2214 E. Maple Rd. Birmingham, Mich.

**Helpful Installation Manual
For Drainage Structures**

42. A 46-page manual, well worth careful study by designers and field engineers dealing with drainage structures, culverts, sewers or conduits, is offered by Arnco Drainage & Metal Products, Inc., Middletown, Ohio. Proper location of the structures, base preparation, assembly and backfill are some of the many items covered in detail. Use the handy coupon for free copy.

**Engineering Facts
About Transite Pipe**

83. This compilation of Johns-Manville's "Engineering Facts" series presents concise, factual information about Transite's many economic and engineering advantages, and includes informative case histories plus dimensions and data for your files. Write Johns-Manville, Box 290, New York 16, N. Y., or use the handy coupon.

**Complete Catalog for Engineers Shows
Water and Sewage Plant Equipment**

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinder, grit collectors, "Jigrit" washers, sludge collectors, feeders, conveyors and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use coupon or write Jeffrey Mfg. Co., Columbus 16, Ohio.

**Data Offered On
Mixed Flow Pumps**

201. Data on the complete line of Worthington Mixflo pumps of the two-vane, non-clogging sewage type is offered in 16-page bulletin W-317-II-16. Salient features are outlined, typical sections, performance curves and general data for five types are included. Helpful charts aid in shafting selection. Copies available by mail coupon or from Worthington Pump and Machinery Corp., Harrison, N. J.

**Data on Design of
Grit Collectors and Washers**

202. Grit collection and separation of organic materials from settled grit is described in Link-Belt Bulletin 1942. Typical installations are shown, and design data is provided, together with specifications. Use coupon for copy, or write Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

**How to Estimate Quantity
Of Joint Compound Needed**

229. Directions for using Atlas G-K Sewer Joint Compound plus a handy table quantity of compound and joint required per joint of sewer pipe are presented in Bulletin M20-1. Get full data on this permanent joint material from Atlas Mineral Products Co., 10 Pine St., Mertztown, Pa., or use coupon.

**REFUSE COLLECTION
AND DISPOSAL**

**How to Lower Costs
Of Refuse Collection**

35. For saving trucks, labor and time in city rubbish collection get details of the new Dumpster-Kolektor described in literature just published by Dempster Bros., Inc., 941 Dempster Bldg., Knoxville 17, Tenn.

**20 Questions and Answers
On Sanitary Landfill**

75. The advantages of sanitary landfill, factors in site selection, kind and size of equipment needed, capacity of a given site and other important engineering considerations are discussed in Form 1084 prepared by the Trackson Co., Milwaukee 1, Wis. Check the coupon for complete information on this refuse disposal method.

**Thinking of Sanitary Landfills?
Get This Booklet Now**

131. One of the most informative descriptions of the sanitary landfill method of garbage and refuse disposal is presented in Caterpillar's 16-page booklet "A Look to the Future with

PUBLIC WORKS for April, 1951

Sanitary Landfill." The booklet is designed to serve as a guide to proper site selection, the choice of the right equipment to do the job, and the actual operations of sanitary fill. Pictorial treatment shows how and when to start such a program, what to look for in a site, benefits received by the community, and other important considerations. Published by the Caterpillar Tractor Co., Peoria 8, Ill. Check the coupon for your copy.

**Investigate This Plan
For Garbage Elimination**

164. A new presentation, written especially for municipal officials, offers a modern solution for the garbage disposal problem. Be sure you have this up-to-date information on the elimination of city garbage collection by the use of Hotpoint Disposall units. Check the coupon now. Hotpoint Disposall Department, 5600 West Taylor St., Chicago 44, Ill.

An Incinerator Necessity

215. Recuperators featuring individual replacement of the heat transfer elements (silicon carbide tubes) for maximum accessibility and efficiency are described and illustrated in Bulletin 14 issued by Fitch Recuperator Co., Dept. PW, Plainfield Nat'l Bank Bldg., Plainfield, N. J.

WATER WORKS

**The Modern, Streamlined
Elevated Tank**

32. A new 8-page bulletin describes the Waterplere, a modern elevated water tank of welded steel construction for general service gravity water pressure and fire protection. Construction details, illustrations of typical installations and table of standard sizes from 25,000 to 250,000 gallons capacity are included. Check the coupon. Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

**Is Your City
Metered 100%**

33. 100% metering as practiced by many cities requires accurate, dependable meters with interchangeable parts. Cutaway views of every part, capacity and size data are all included in handsome American-Niagara water meter booklet available from Buffalo Meter Co., 2929 Main St., Buffalo 14, N. Y.

**Do Your Water Mains
Need Cleaning?**

38. Literature on Flexible method of cleaning water mains any size from 2" to 72", giving full details and list of nearest representatives in all parts of country. Address: Flexible Underground Pipe Cleaning Co., 9059 Venice Blvd., Los Angeles, Calif.

**Data on Modern, High-Rate
Water Treatment Plant**

40. This handsome 28-page bulletin gives a comprehensive yet understandably written story of the development of the Accelerator, and explains its principles, advantages, design considerations, operation and applications. Helpful flow diagrams and specifications. For a copy use the coupon or write Inflico Inc., Box 5033, Tucson, Ariz. Ask for Bulletin 1825.

**Engineering Data on
Diatomite Filters**

44. Detailed information and typical plans of Sparkler diatomite filters for swimming pools of municipal water systems is available to engineers and municipal officials. These filters feature self-cleaning filter elements which cut wash water to a minimum. Get this material now by using coupon. Sparkler Manufacturing Co., Mundelein, Ill.

**Quick Way to
Locate Leaks and Pipes**

57. Leak Locators. Again available to waterworks superintendents, the Globe line of leak locators, dipping needles and pipe finders. Several leaflets describing the original Geophone leak locator, Little Wonder pipe phone, and the Magnetic Dipping Needle. Globe Phone Mfg. Corp., Dept. P., Reading, Mass.

**All About Cement-Mortar
Lining of Water Mains**

133. Here, in a really beautiful booklet, is practically everything you need to know about this method of lining mains in place—the needs, methods, and results that will interest you. Centriline Corp., Dept. PW, 140 Cedar St., New York 6, N. Y.

Helpful Data on Mechanical Joints

138. Get Circular 49 from M & H Valve & Fittings Co. for important information and installation dimensions of M & H AWWA Mechanical Joint Valves and Hydrants. Features include ease of installation, construction economy, long life. Use coupon or write M & H Valve & Fittings Co., Anniston, Ala.

Easily Cleaned, Long Run Filter Bed Media

140. Bulletins on Anthrafil tell the reasons why selected, graded crushed anthracite is superior to sand as a filtering material. Have you made a full investigation? Write Anthracite Equipment Corp., Wilkes-Barre, Pa.

Faster Pipe Laying With Precast and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precast bell and spigot pipe as described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

Rehabilitation for Your Water System

153. Whether your water supply system requires a complete rehabilitation program including an engineering survey, hydraulic analysis, reconduiting and relining construction, or merely pipe cleaning and coating, it is wise to plan your campaign without delay. Get full data now on the requirements to put your system in top condition. Write Pittsburgh Pipe Cleaner Co., 133 Dahlem St., Pittsburgh 6, Pa., or check handy coupon.

What You Should Know About Meter Setting and Testing Equipment

166. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 30.

Handy Catalog Covers All Pipe Repairs

167. A complete catalog covering repair clamps, packings and gaskets of several designs to suit all needs is offered by the Smith-Blair Co. Directions for use show ease of application. Every water works needs a copy of this catalog for ready reference. Available by using coupon or writing Smith-Blair, Inc., 535 Railroad Ave., So. San Francisco, Calif.

Helpful Data on Well Water Systems

173. A comprehensive, 48-page book on Layne Water Well Systems covers gravel well wells, underreaming, cemented walls, rock wells and other well types. Applications of shutter screens and vertical turbine pumps are shown, together with water treatment and conditioning equipment. Ten pages are devoted to useful engineering tables and measurement data. Check the coupon today or write Layne & Bowler, Inc., Dept. PW, Memphis 8, Tenn.

How Your Filter Washing Can Be Improved

188. More thorough sand washing with the elimination of mud balls and cracking with resultant longer filter runs are claimed for the Palmer Filter Bed Agitator, described in bulletins issued by the Palmer Filter Equipment Co., P. O. Box 1655, Erie, Pa.

Automatic Pump Control For Your Water System

239. In Bulletin 230-G4, Builders-Providence outlines the "Pressureflo Control" system which is said to save on first cost by providing ground level storage in residential areas; permit untended operation of outlying stations; furnish instantaneous response to meet fire flow. Flow diagrams and typical applications are included. Mail coupon to check this versatile system. Builders-Providence, Inc., Providence 1, R. I.

Tested Jointing Materials

102. "Hydrotite" is a self-caulking, self-sealing joint compound for bell and spigot joints. For data book and sample write Hydraulic Development Corp., 50 Church St., New York, N. Y.

Improved Clarification with Carter Circular Collectors

61. Latest 16-page bulletin on water and sewage equipment, No. 4906, gives complete data and specifications on Carter's three different types of clarifiers. A valuable working guide for every sanitary engineer. Ralph R. Carter Sales, Inc., Dept. PW, 188 Atlantic Ave., Hackensack, N. J.

Cast Iron Pipe and Fittings For Every Need

65. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLaValde centrifugally-cast and pit-cast pipe, bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Dept. PW, Burlington, N. J.

Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal, control of certain tastes and odors, plus other aids in high quality water production. Check coupon for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

Factors to Consider in Elevated Tank Selection

80. An interesting discussion of the factors to be considered for selection of elevated capacities and sizes, required fire flows and other useful data are included in a bulletin on elevated water storage published by Pittsburgh-Des Moines Steel Co., Neville Island P. O., Pittsburgh 25, Pa.

Speedier, Space-Saving Purification Apparatus

81. A new 12-page bulletin, No. 2204, tells how the Spaulding Precipitator, in removing impurities from a liquid by precipitation, adsorption, settling, and upward filtration, occupies less space, uses less chemicals and speeds up treatment. Permutit Co., 330 West 42nd St., New York 18, N. Y.

Painting Water Tanks For Longer Protection

94. High labor costs demand special consideration when painting elevated water tanks. This and other factors involved in proper paint selection are discussed in a bulletin issued by Jos. Dixon Crucible Co., Dept. 4-P, Jersey City 3, N. J. Helpful specifications for repainting water tanks are also included.

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves is contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., 200 Eliot Street, Fairfield, Conn.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

How to Tap Concrete Pressure Pipe

126. The simple steps required in making a pressure tap in concrete pressure pipe are explained in a booklet issued by Lock Joint Pipe Company. Be sure you know how either large connections or small service outlets may be made economically and without sacrifice of strength. Just check the handy coupon. Lock Joint Pipe Co., Box 269, East Orange, N. J.

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methods of controlling various forms of microscopic life commonly encountered in water supply systems. Contains descriptive material, plus 43 photo-micrograph studies of organisms discussed.

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"Copper Sulphate for Root and Fungus Control in Sanitary Sewers and Storm Drains," by John W. Hood, contains information published for the first time. This material includes actual methods for control and operating procedure. Here's the book

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PW-4

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WORTH TELLING...



by Arthur K.
Akers

★ Dr. John V. N. Dorr, chairman of the board of **The Dorr Company**, has been made a member of the legion of Honor of the American Institute of Mining and Metallurgical Engineers, in recognition of his fifty years of service as a member.

★ **Raymond F. Allen** is now general manager of **Shunk Manufacturing Company**, Bucyrus Ohio makers of blades for earth-moving equipment. **J. D. Newkirk**, pictured here, is promoted to assistant sales manager of the same company, in charge of all customer relations.



Mr. Scholl



Mr. Newkirk

★ **Allis-Chalmers Manufacturing Company** announce **W. A. Roberts** as newly-elected president; **W. C. Johnson**, executive vice president of the entire company, and **R. S. Stevenson** vice president in charge of the tractor division, with **Willis G. Scholl** now general sales manager of the same division.

★ **Mark Owen** we welcome back to New York as a vice-president of **Nichols Engineering and Research Corporation** again.

★ **A. William Fraser** is now midwest sales manager for the **Worthington Pump and Machinery Corporation**, with headquarters in Chicago. He was formerly general European manager.

★ **T. W. Woodruff** has been advanced to manager of the pump division of **Fairbanks, Morse & Company, Chicago**.

★ **J. W. (Bill) Simpson**, executive vice president of **Mueller Company, Decatur, Ill.**, suffered a heart attack at his desk and died en route to the hospital.

★ In similar vein we record the passing of **R. G. Milton**, assistant to Advertising Manager **H. F. Barrows** of the **Austin-Western Company** at Aurora, Ill.

★ **Tom La Vorene**, vice president and general manager of **City Industrial Sales Inc.**, heads the newest Chicago distributors for International and Chrysler gas and diesel industrial engines with a staff of "the best engine men in captivity" to cover their area.

★ **The Frank G. Hough Company**, Libertyville, Ill. (**PAYLOAD-ER** tractors and tractor shovels to you) played host to more than 200 distributors to celebrate completion of their new plant.

★ **S. B. Applebaum** is now manager of the water treatment division of **Cochrane Corporation**, Philadelphia. He was founder of **Liquid Conditioning Corporation**, now a Cochrane subsidiary.

★ **Victaulic Company of America**, makers of pipe couplings, fittings, and tools, has moved from New York City to its modern building in Union, N. J.

★ **Ray W. Lindsey** has joined the engineering sales staff of **Builders-Providence** and **Omega Machine Company** in their Wilmette, Ill., office.



Mr. Owens

★ **Robert H. Owens** has been elected president and general manager of **Roots-Connersville Blower Corporation**, affiliate of **Dresser Industries**, vice **John Avery** deceased.

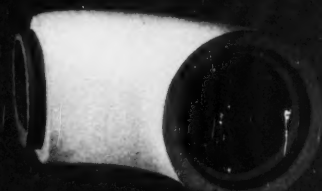
★ One day **Abraham Lincoln** was walking along a Springfield street with his two small sons, both crying lustily. "What's the matter with the boys?" inquired a neighbor. "Same as what's the matter with the whole world," answered Lincoln; "I've got three walnuts and each boy wants two."

—Julius HYMAN News Letter.

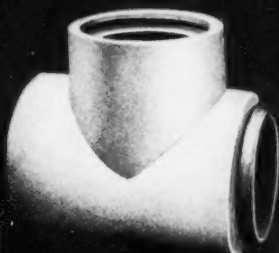
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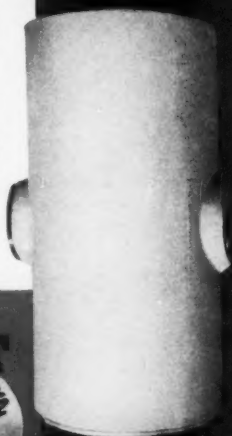
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CAST IRON PIPE



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Elbows, wyes, tees, crosses, outlets, manholes, reducers, bevels, adaptors... any special pipe you require is available in standard Lock Joint design. And if standard specials won't do the job, "special" specials may be designed to individual specifications. Lock Joint Concrete Pressure Pipe can be connected swiftly and efficiently to any standard water pipe of other material. All specials are engineered with the same care and high safety factor that have made Lock Joint the pipe of unexcelled durability and dependability.

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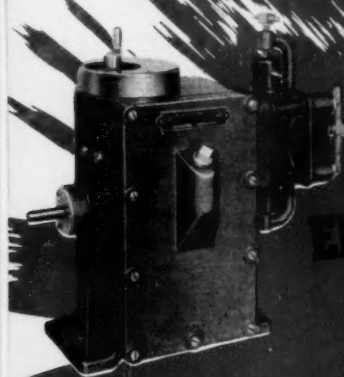
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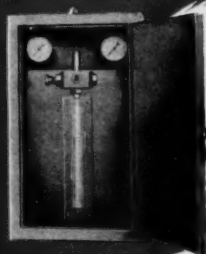
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W&T Bell Drive Chlorinator—uses a gas engine or motor drive.



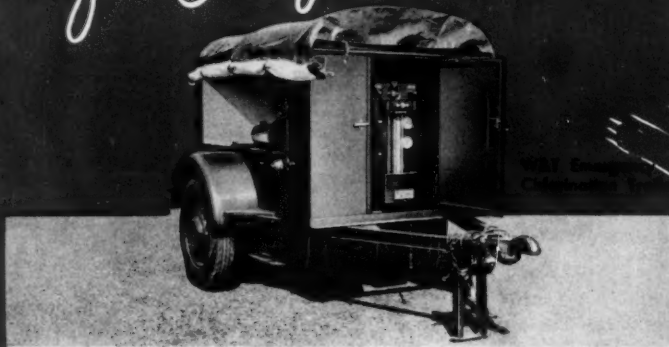
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Your W&T Engineer will be glad to help you review your requirements and select the equipment you need. Why not call on him? There's no obligation, of course.

S-63

